SONY®

PORTABLE VIDEOCASSETTE RECORDER

BVW-50

BETACAM SP™

MAINTENANCE MANUAL

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Serial No. 10001 and Higher

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SECTION 1
SERVICE INFORMATION

1-1. SUPPLIED ACCESSORIES

1. Carrying case
2. Extension harness
   (for connection between VRP-1 and CC-47 Boards)

1-2. OPTIONAL ACCESSORIES

1. BVR-3
2. RF modulator
3. Remote Control Cable
   (for connection between BVW-50 and BVR-3)
   RCC-B5G (5m)
   RCC-B10G (10m)
   RCC-B30G (30m)
4. AC power adaptor
   AC-500
5. Battery Pack
   BP-90A
   NP-1B
6. Battery Charger
   BC-210 : for NP-90A
   BC-1WA : for NP-1B

1-3. SPECIFICATION

Power requirements	: 12V DC • a BP-90A battery pack (Ni-Cd, 5.0Ah) • two NP-1B battery packs (Ni-Cd, 2.3Ah) AC power using an AC-500 AC power adaptor
Power consumption	: PB/EE REC, 29W SAVE REC, 19W
Operating temperature	: 0°C to +40°C
Storage temperature	: -20°C to +60°C
Operating humidity	: 25% to 85%
Weight	: 6.6kg
Dimensions	: 317×140×348mm (w/h/d)
Tape speed	: 118.6mm/s
Record and playback time	: Max. 90min. (with a BCT-90ML video cassette)
Fast forward/rewind time	: For L cassette (BCT-90ML), less than 7 min. For S cassette (BCT-30M), less than 2.5 min.
Fast forward/rewind speed	: Max. ±16 times normal speed (with monochrome picture)
Search speed	: Max. ±5 times normal speed (with color picture)
Continuous operating time	: Approx. 180 min. using a fully charged BP-90A battery pack operated in SAVE REC Mode
Video cassette	: 1/2 inch Betacam, Betacam SP cassette Metal tape: BCT- 5M/10M/20M/30M/5ML/10ML/20ML/30ML/60ML/90ML and compatible Oxide tape: BCT- 5G/10G/20G/30G/5GL/10GL/20GL/30GL/60GL/90GL and compatible

VIDEO
Video recording system
Luminance : FM
Chrominance : Compressed time division multiplexed FM

		Metal tape	Oxide tape
Band width	Luminance	30Hz to 4.5MHz +0.5/−3.0dB	30Hz to 4.1MHz +0.5/−6.0dB
	Chrominance (R-Y, B-Y)	30Hz to 1.5MHz +0.5/−3.0dB	30Hz to 1.5MHz +0.5/−3.0dB
Signal to noise ratio	Luminance	more than 51dB	more than 48dB
	AM	more than 53dB	more than 50dB
	FM	more than 53dB	more than 50dB
K-factor (2T pulse)		less than 2%	less than 3%
DG		less than 2%	less than 3%
DP		less than 2°	less than 3°
Y/C delay		less than 20nsec	less than 20nsec

AUDIO
Audio recording system
LNG : AC Bias
AFM : FM

		Metal tape	Oxide tape
Frequency response	LNG	40Hz to 15kHz +1.5/−3.0dB	40Hz to 15kHz ±3.0dB
	AFM	20Hz to 20kHz +0.5/−2.0dB	---
Dynamic range AFM		more than 80dB	---
Signal to noise ratio	LNG (at 3% distortion)	more than 72dB	more than 50dB (without the audio NR system)
Distortion (at 1kHz)	LNG	less than 1.5%	less than 2%
	AFM	less than 0.5%	---
Crosstalk (at 1kHz)	LNG	less than −55dB	
	AFM	less than −65dB	---
Wow and flutter LNG		less than 0.15% rms	

1-4. MATCHING CONNECTORS

When external cables are connected to the various connectors on the connector panel during maintenance, the hardware listed (or equivalents) must be used.

Panel Indication		Connector
SC IN VIDEO IN VIDEO OUT 1/2 TC IN TC OUT		1-560-069-11, BNC, MALE
CAMERA		1-564-183-00 26P, MALE (ROUND TYPE)
DUB/COMPONENT OUT		1-560-995-00 12P ,MALE (ROUND TYPE)
DC OUT		1-565-654-11 4P, MALE (ROUND TYPE)
RFU OUT	VIDEO DC AUDIO	RFU ADAPTOR AV CABLE
DC IN 12V		1-518-362-00 XLR 4P, FEMALE
REMOTE		1-560-651-00 D-SUB 9P, MALE 1-561-749-00 JUNCTION SHELL
AUDIO IN		1-508-084-00 XLR 3P, MALE
AUDIO OUT		1-508-083-00 XLR 3P, FEMALE

1-5. INPUT/OUTPUT SIGNAL CONNECTORS

INPUT

VIDEO IN : Composite : 1.0Vp-p, 75Ω
Advanced sync : 4.0Vp-p, 75Ω

CAMERA : Composite : 1.0Vp-p, 75Ω
Component :
. Luminance, 1.0Vp-p, 75Ω
. R-Y/B/Y, 0.7Vp-p, 75Ω

AUDIO IN : −60/−20/+4dBs (selectable)
CH-1 to CH-4 more than 3 kΩ, balanced

TC IN : 0.5~18Vp-p, more than 10 kΩ, unbalanced

SC IN : 2.0±1.0Vp-p, 75Ω, unbalanced

OUTPUT

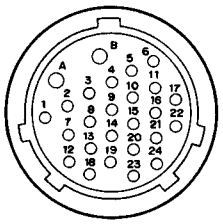
VIDEO OUT 1,2 : Composite : 1.0Vp-p, 75Ω

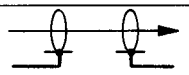
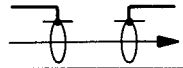
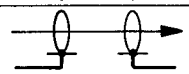
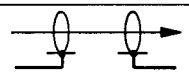
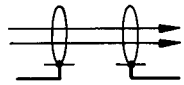
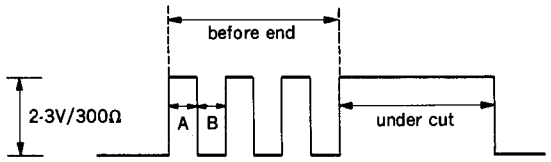
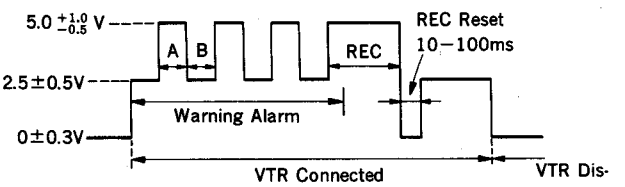
DUB/COMPONENT OUT : Luminance : 1.0Vp-p, 75Ω
Chrominance : R-Y, 0.7Vp-p, 75Ω
B-Y, 0.7Vp-p, 75Ω

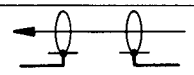
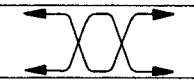
AUDIO OUT : +4dBm (600Ω load), balanced
. EARPHONE
−20dBs max. (8Ω load), adjustable
. HEADPHONES
−20dBs max. (8Ω load), adjustable

TC OUT : 2.2Vp-p ±3dB (600Ω load), unbalanced
1.2Vp-p ±3dB (75Ω load), unbalanced

CAMERA (26P)

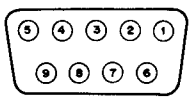


No.	SIGNAL	DIRECTION	SPECIFICATION
A	N.C.		
B	N.C.		
1	COMPOSITE VIDE		Zi=75Ω±5%
2	GND (COMPOSITE VIDEO)		
3	GND (LUMINANCE)		Zi=75Ω±5%
4	LUMINANCE		
5	R-Y VIDEO		Zi=75Ω±5%
6	GND (R-Y)		
7	B-Y VIDEO		Zi=75Ω±5%
8	GND (B-Y)		
9	MIC (X)		Zi=3k to 10kΩ
10	MIC (Y)		
11	GND (MIC)		BALANCED
12	VTR START/STOP		START: $5\ ^{+3}_{-1}$ V STOP: $0\ ^{+0.5}_{-0}$ V or open
13	BATT, IND		 14.5V Max open, 2-3V with 300Ω load A/B: 50±10% duty, frequency 1±0.2Hz or 4±0.8Hz
14	(SPARE)		
15	REC/TALLY		 A/B: 50±10% duty, frequency 1±0.2Hz or 4±0.8Hz
16	(SPARE)		

No.	SIGNAL	DIRECTION	SPECIFICATION
17	SHIELD	———	VTR GND
18	PB VIDEO		VS=1Vp-p±1dB DC: 0±200mV Zo=75Ω±5%
19	GND (PB VIDEO)		
20	VTR SAVE		AUDIO MONITOR Zo: Low Impedance Level: −6dBs VTR SAVE Ri≧100kΩ (Ri: input DC resistance)
21	(SPARE)	———	
22	COLOR FRAMING PULSE		Zi≧100kΩ
23	(SPARE)		
24	(SPARE)		

REMOTE IN

〈External view〉



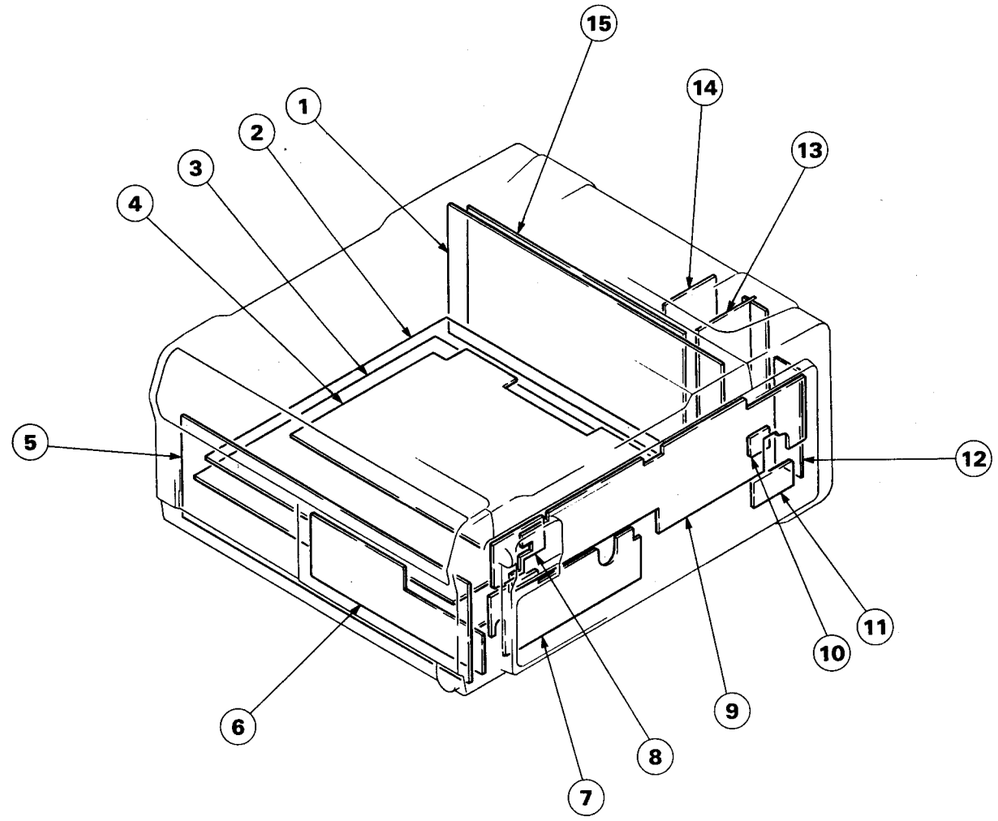
PIN No.	SIGNAL
1	Frame Ground
2	Receive A
3	Transmit B
4	Transmit Common
5	Spare
6	Receive Common
7	Receive B
8	Transmit A
9	Frame Ground

1-6. PRINTED CIRCUIT BOARDS

SYSTEM	PC BOARD	FUNCTION
DRUM&RF	PA-119	RF PB AMP
	SR-50	SLIP-RING
	LD-39	PG, FG AMP
VIDEO	VRP-1	Y/C SEP DEC CTDM MOD/DEMOD REC AMP
	TBC-19	TBC ENC
	CC-47	INPUT SELECT
AUDIO	AU-142	REC/PB AMP, AFM, BIAS/ERASE OSC, NOISE REDUCTION
	VR-118	REC/PB VOL, LIMITER
	CP-164	MIC AMP OUTPUT AMP
SYSTEM CONTROL & SERVO	SST-1	SYSTEM CONTROL DRUM/CAP/REEL SERVO MOTOR/SOLENOID/DRIVER TIME CODE
	KY-207	FUNCTION KEY DISPLAY
POWER	FU-52	FUSE
	DC-52	DC IN
	PSW-12	DC-DC CONVERTER
OTHERS	DUS-339	PHONES JACK
	CON-18	TC IN/OUT CONNECTOR
	MB-335	MOTHER BOARD
	SE-158	CASSETTE/TAPE DET THREAD/UNTHREAD DET
	FE-11	FULL ERASE OSC
	TR-57	TENSION REGULATOR
	DET-15	THREAD FG DET
	CS-25	CASSETTE IN DET
	CS-26	CASSETTE UP/DOWN DET
	BC-23	BATTERY TERMINAL

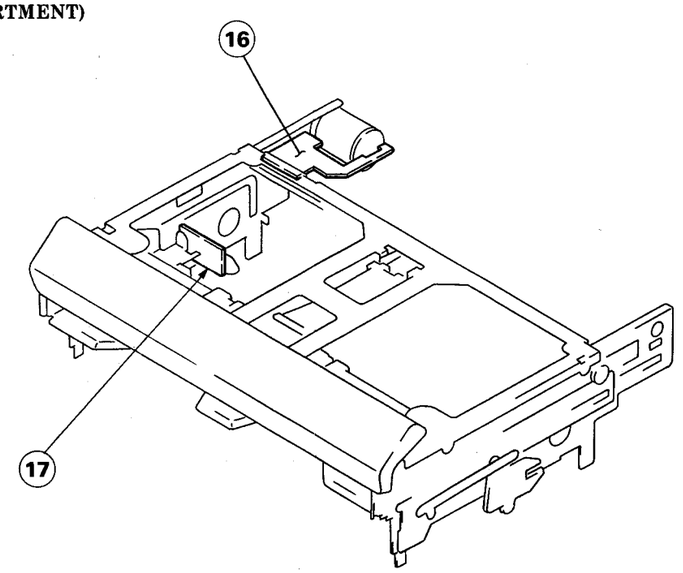
1-7. MAIN PARTS LOCATION

1-7-1. Location of Printed Circuit Boards



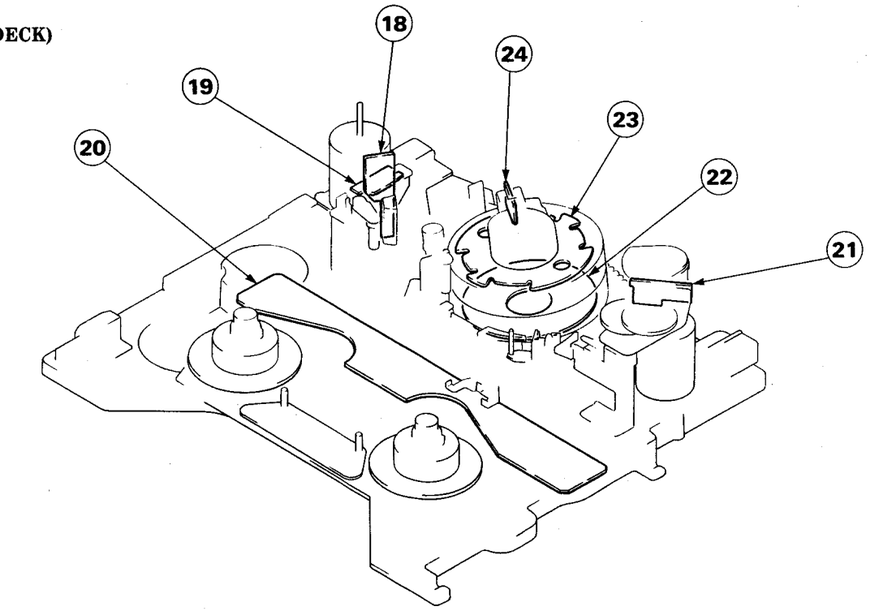
① MB-335 Board
② SST-1 Board
③ VRP-1 Board
④ TBC-19 Board
⑤ KY-207 Board
⑥ VR-118 Board
⑦ CC-47 Board
⑧ DUS-339 Board
⑨ CP-164 Board
⑩ DC-52 Board
⑪ CON-18 Board
⑫ FU-52 Board
⑬ PSW-12 Board
⑭ BC-23 Board
⑮ AU-142 Board

(CASSETTE COMPARTMENT)



⑯ CS-25 Board
⑰ CS-26 Board

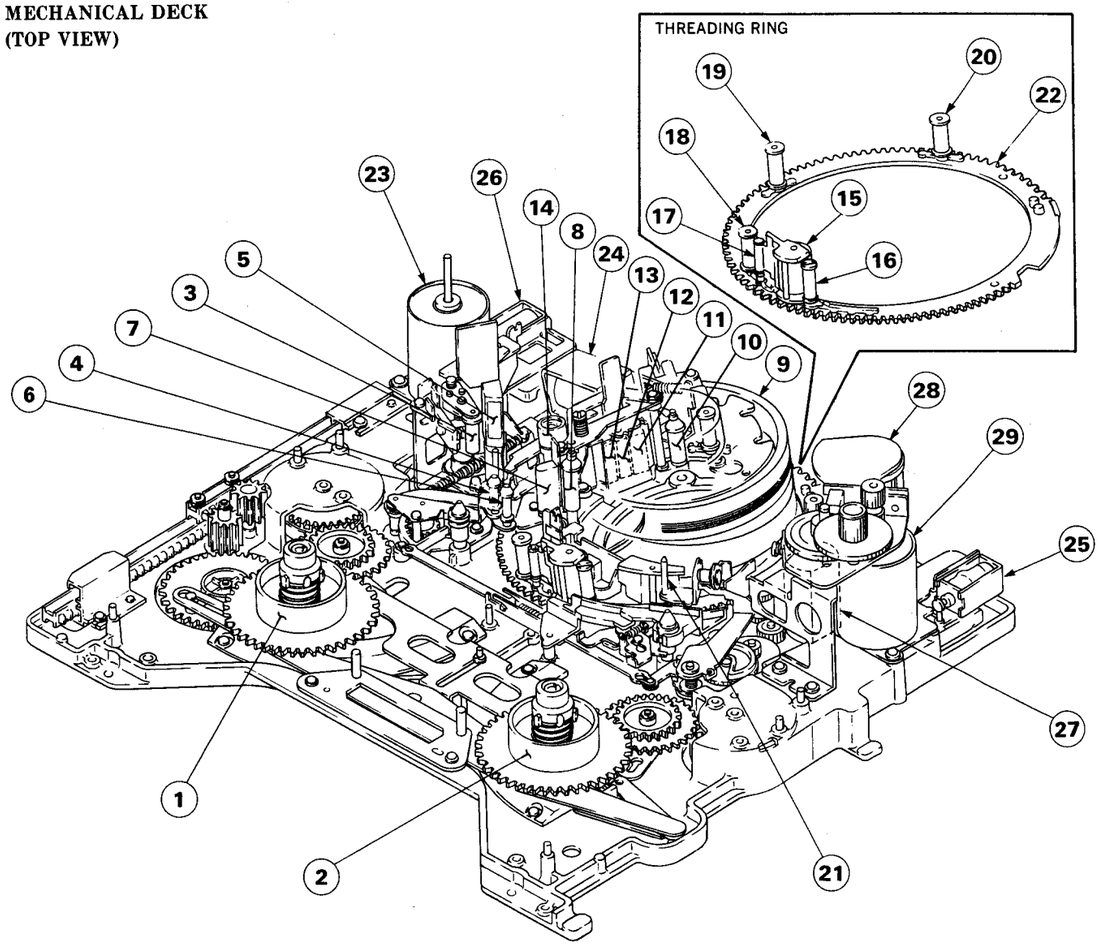
(MECHANICAL DECK)



⑱ FE-11 Board
⑲ TR-57 Board
⑳ SE-158 Board
㉑ DET-15 Board
㉒ LD-39 Board
㉓ PA-119 Board
㉔ SR-50 Board

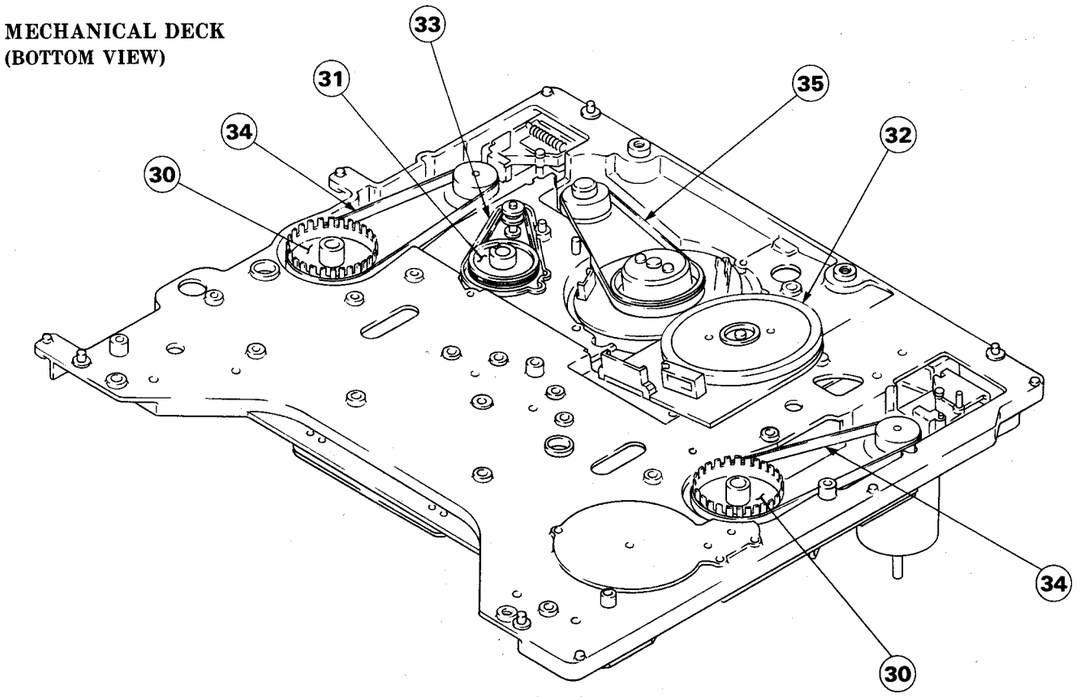
1-7-2. Location of Main Mechanical Parts/Components

MECHANICAL DECK
(TOP VIEW)



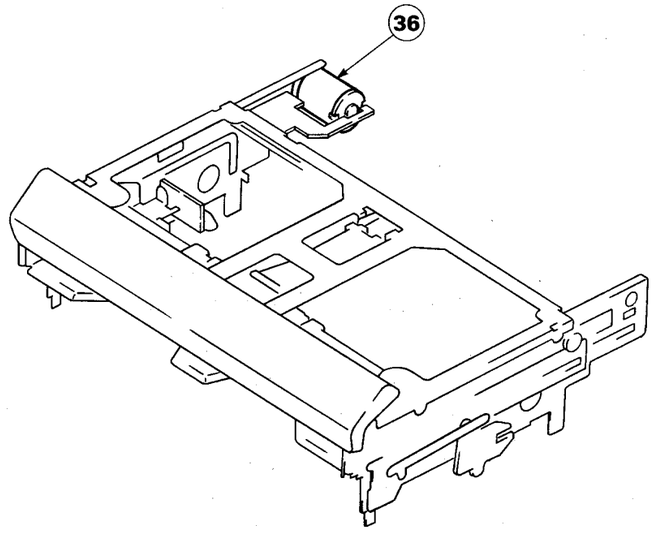
① S Reel Table
② T Reel Table
③ Tension Regulator
④ TG-2
⑤ Full Erase Head
⑥ TG-3
⑦ CTL Head
⑧ Entrance Guide
⑨ Head Drum
⑩ Exit Guide
⑪ Audio Erase Head
⑫ Audio RP Head
⑬ Audio Conf. Head
⑭ Capstan Shaft
⑮ Pinch Roller
⑯ Threading Roller
⑰ Pinch Guide
⑱ RG1
⑲ RG2
⑳ RG3
㉑ Slant Guide
㉒ Threading Ring
㉓ S Reel Motor
㉔ Pinch Solenoid
㉕ T Brake Solenoid
㉖ S Brake Solenoid
㉗ Threading Motor
㉘ Drum Motor
㉙ T Reel Motor

MECHANICAL DECK
(BOTTOM VIEW)



㉚ Relay Pulley
㉛ Deceleration Pulley
㉜ Capstan Motor
㉝ Threading Belt
㉞ Reel Belt
㉟ Drum Belt

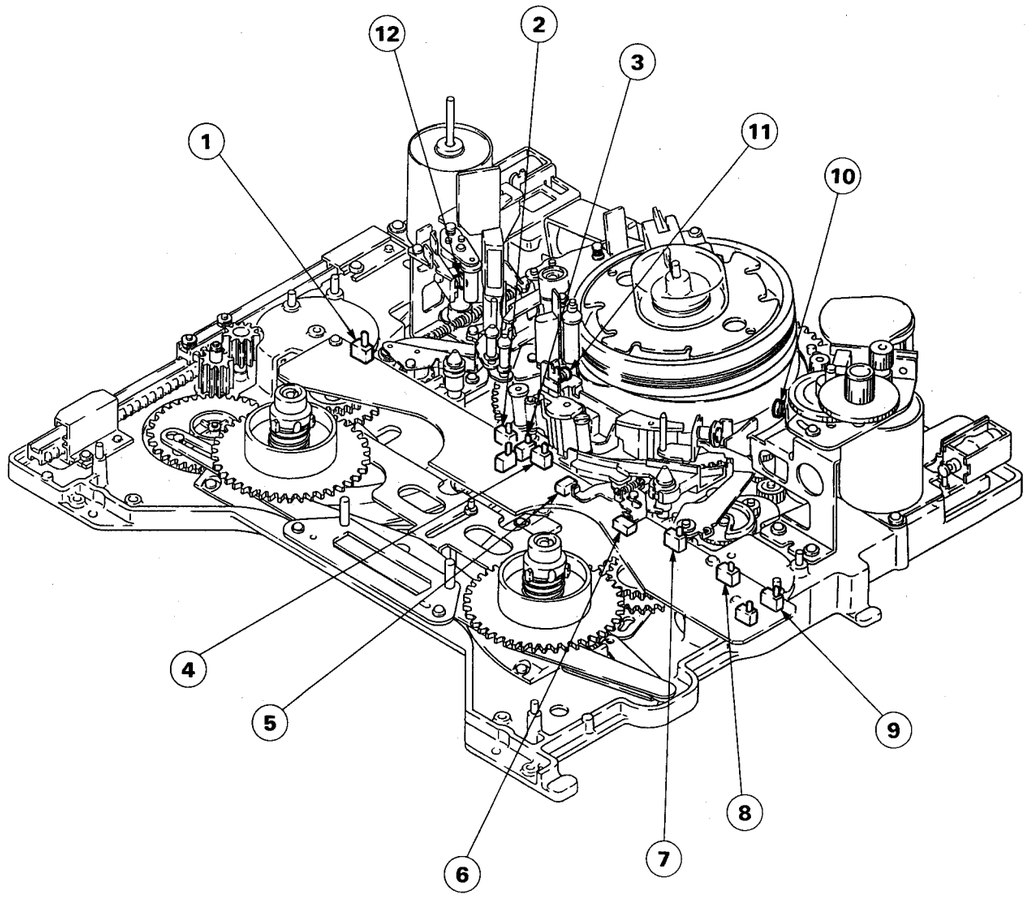
CASSETTE COMPARTMENT



㊱ Cassette Compartment Motor

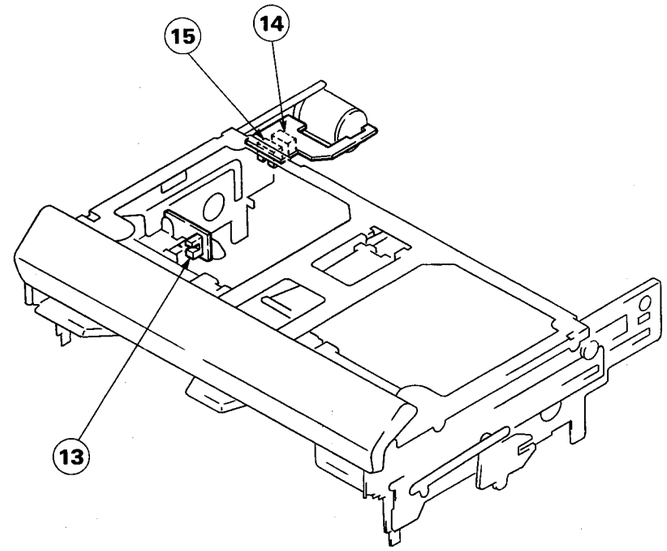
1-7-3. Location of Sensors/Switches

MECHANICAL DECK



① Metal S Tape Rec Inhibit SW
② Reel Hub dia. Detect SW
③ Metal/Oxide Detect SW
④ Tape Thickness Detect SW
⑤ Thread End SW
⑥ Unthread End SW
⑦ Oxide S Tape Rec Inhibit SW
⑧ Metal/Oxide Common Rec Inhibit SW
⑨ L Cassette Sensor
⑩ Tape Beginning Sensor A
⑪ Tape Beginning Sensor B
⑫ Tape End Sensor

CASSETTE COMPARTMENT

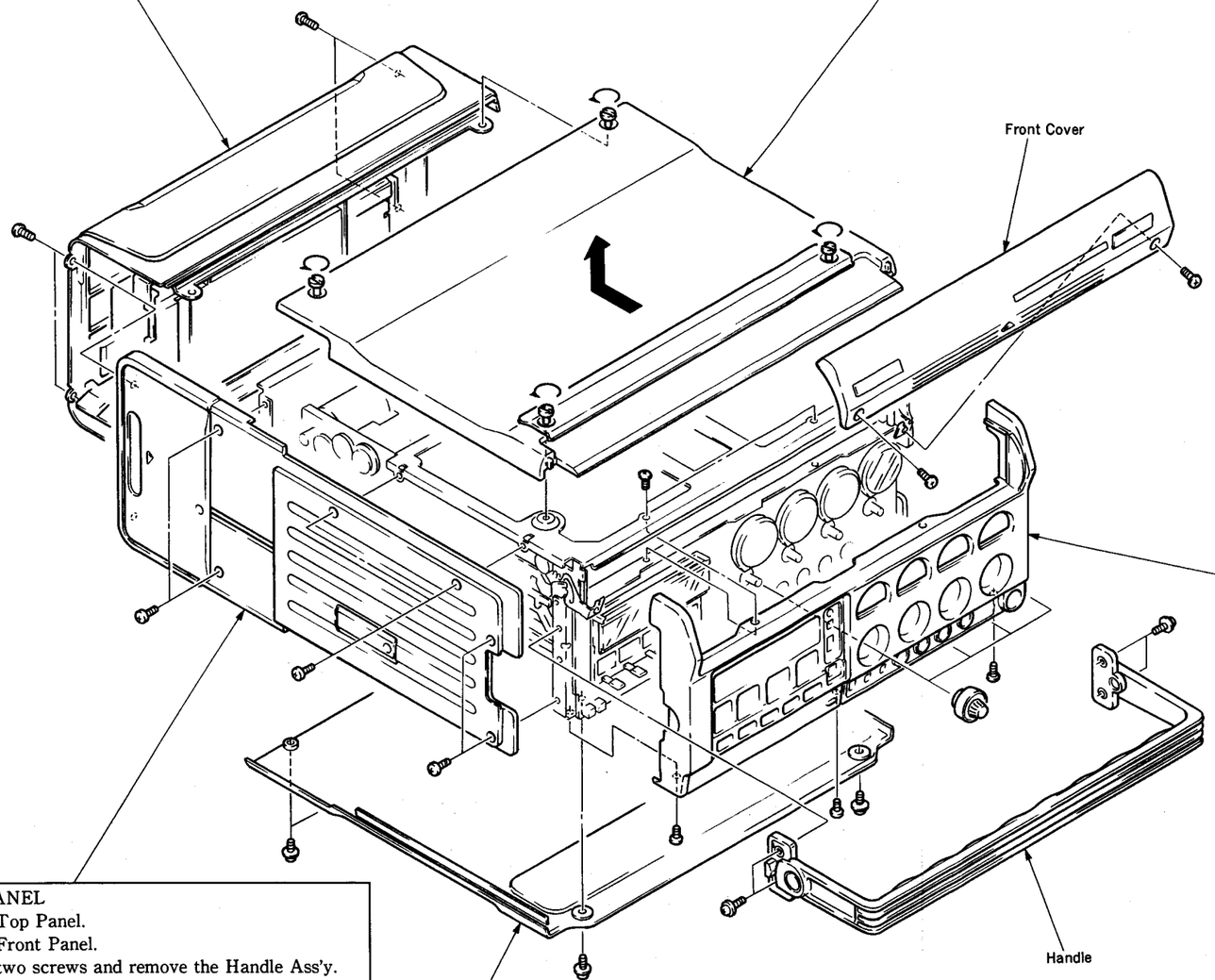


⑬ Cassette In Sensor
⑭ Cassette Down Sensor
⑮ Cassette Up Sensor

1-8. REMOVAL OF CABINET

REAR PANEL BLOCK
1. Remove the Top Panel.
2. Remove the four screws and pull out the Rear Panel Block.
3. Remove the faston terminals from FU-52 and MB-355 Boards.
4. Remove the Rear Panel Block from the unit.

TOP PANEL
1. Loosen the four coin screws and move the Top Panel in the direction of the arrow. (The coin screws cannot be removed because of stoppers.)

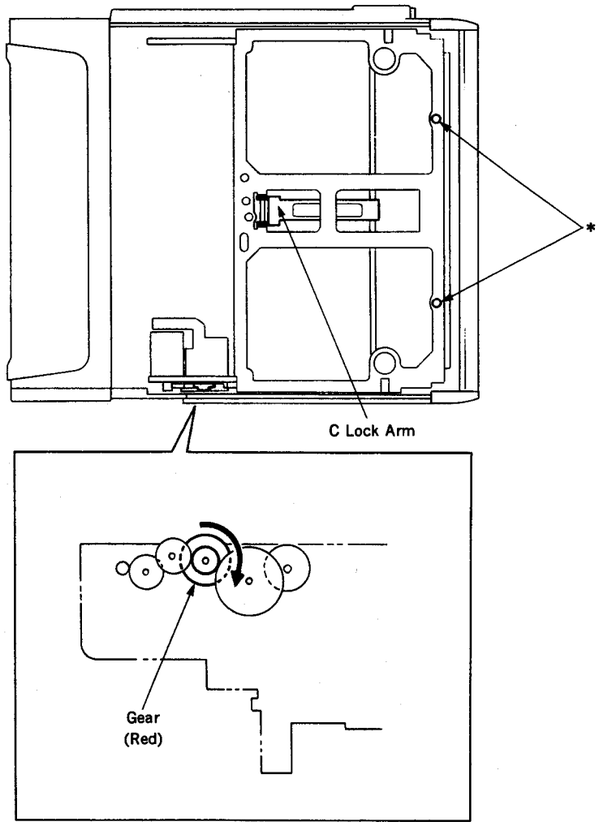


LEFT SIDE PANEL
1. Remove the Top Panel.
2. Remove the Front Panel.
3. Remove the two screws and remove the Handle Ass'y.
4. Remove the two screws which fix the Rear Panel and Left Side Panel.
5. Remove the four screws and remove the Left Side Panel as shown in the figure.

BOTTOM PLATE
1. Loosen the four screws and remove the Bottom Plate.

NOTE: Do not remove the Left Side Panel and Connector Panel Block frequently.
(When removing the connector panel block, refer to section 1-9-6.)

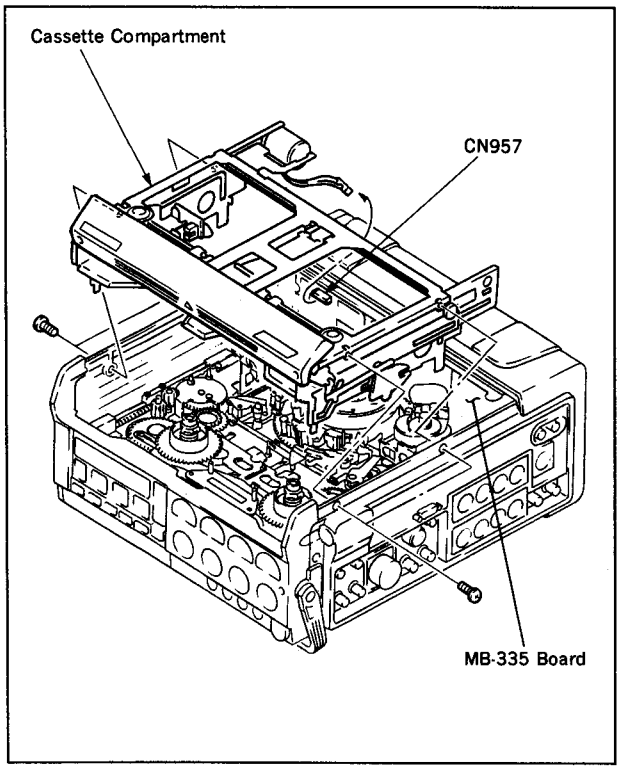
FRONT PANEL
1. Remove the two screws and remove the Front Cover.
2. While lifting up the C Lock Arm of the Cassette Compartment, turn the gear (red) in the direction of the arrow. Slide the Cassette Compartment and remove the two screws from the hole (* mark) as shown in the figure.
3. Remove the three screws and remove the Front Panel. At this time, the five control knobs are out from the Front Panel, do not lose them.



1-10

1-9. REMOVAL OF CASSETTE COMPARTMENT

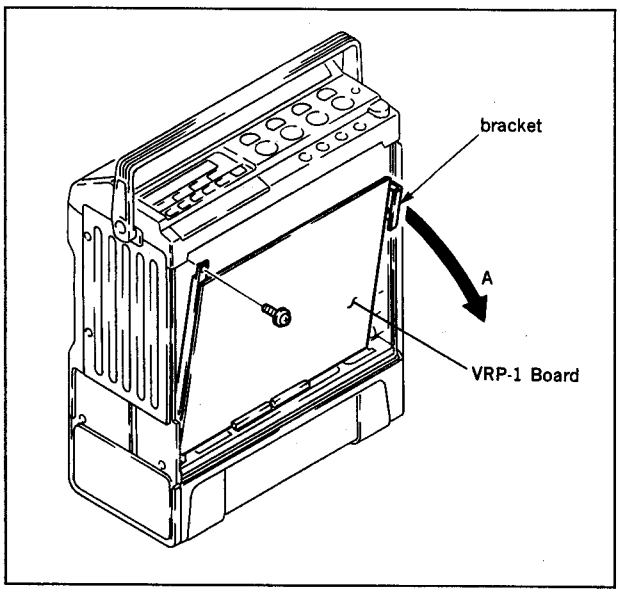
(1) Put the unit into the Intermediate Position referring to section 3-1.
(2) Open the Front Cover and remove the four screws from the sides of the unit as shown in the figure.
(3) Disconnect the CN957 of the motor from the MB-335 Board.
(4) Remove the Cassette Compartment from the unit.



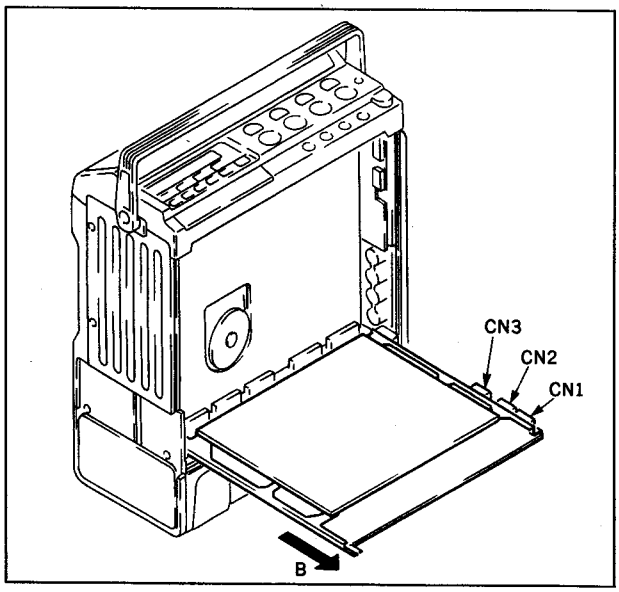
1-10. REPLACEMENT OF PRINTED CIRCUIT BOARD

1-10-1. VRP-1 Board

(1) Remove the Bottom Plate.
(2) Remove the screw and pull the bracket in the direction of arrow A. Open VRP-1 Board.



(3) When removing, pull VRP-1 Board in the direction of arrow B.
(4) When installing, connect CN1, CN2 and CN3 to CC-47 Board securely.

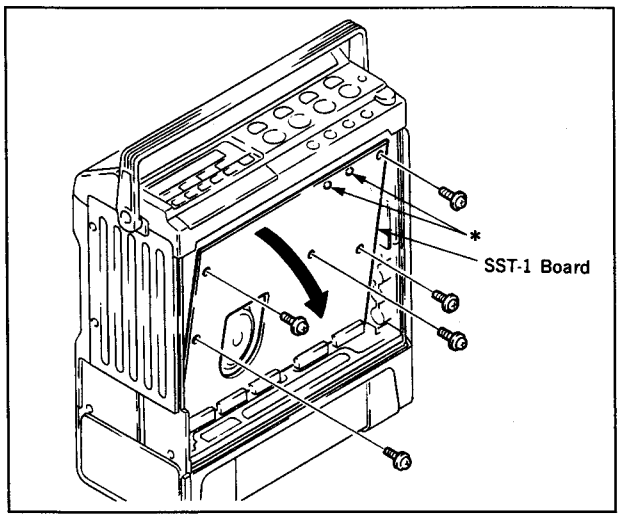


1-10-2. SST-1 Board

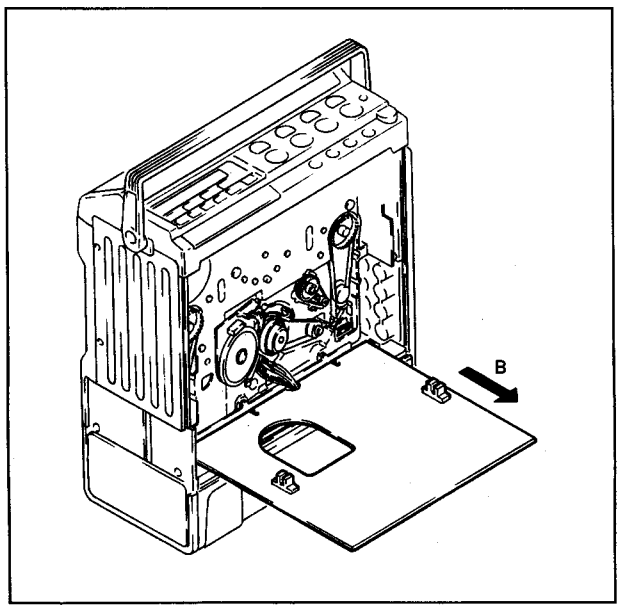
NOTE: Adjustment data is memorized in IC520 (address P-10). When replacing SST-1 board, remove IC520 from old PC board and mount it to new SST-1 Board.

(1) Open VRP-1 Board referring to section 1-9-1.

(2) Remove the five screws and open SST-1 board in the direction of arrow A. Do not loosen screws marked with * because the bracket is installed behind the PC board.



(3) When removing, pull SST-1 Board in the direction of arrow B.



1-10-3. AU-142 Board

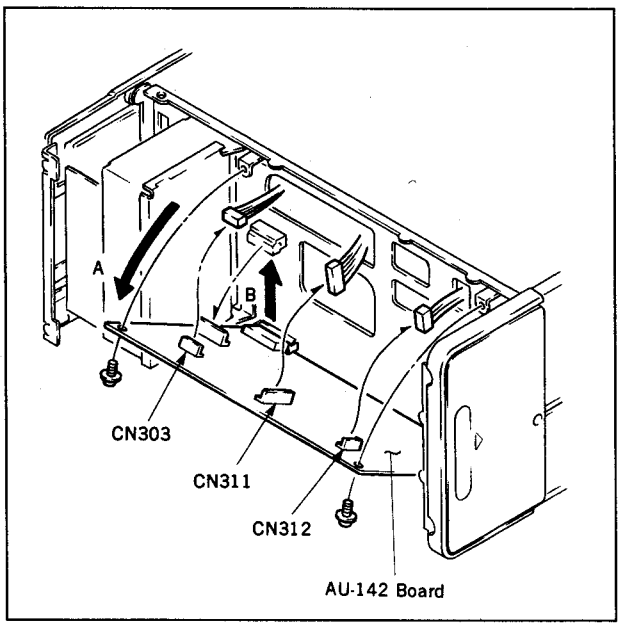
(1) Remove the Rear Panel Block form the unit referring to section 1-7.

(2) Disconnect CN311, CN312 and CN303 from AU-142 Board.

(3) Remove the two screws and open AU-142 Board in the direction of arrow A.

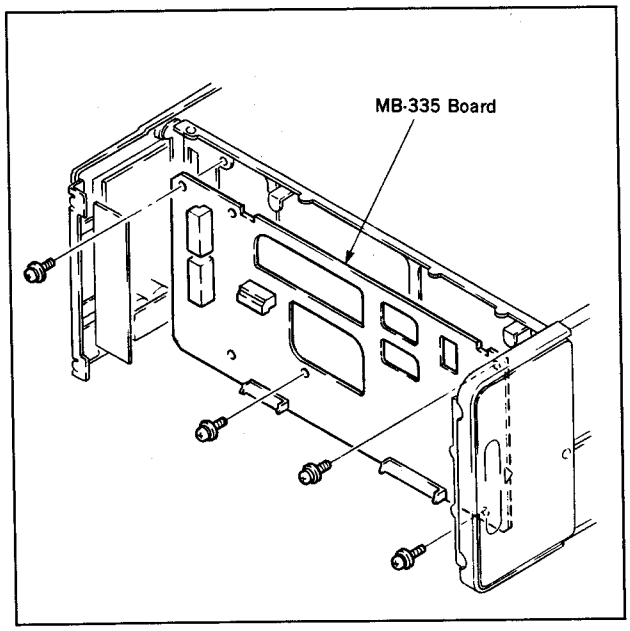
(4) When removing, pull AU-142 Board in the direction of arrow B.

(5) When installing, connect the connectors between AU-142 Board and MB-335 Board securely.



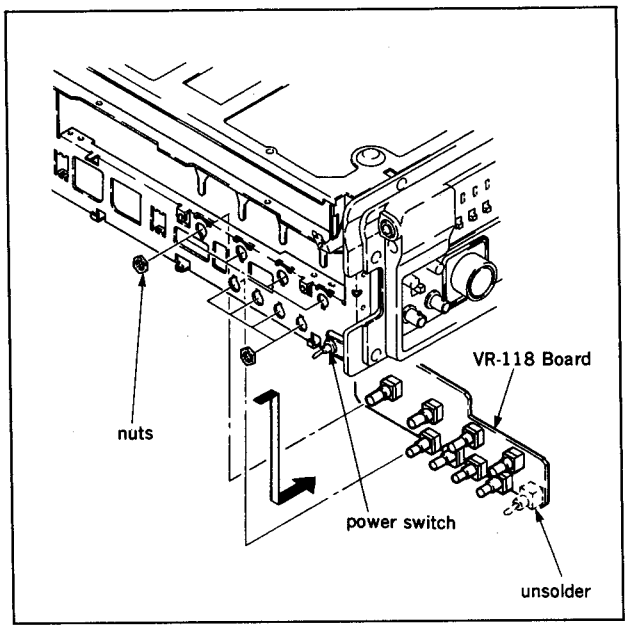
1-10-4. MB-335 Board

(1) Remove SST-1 Board referring to section 1-9-2.
(2) Remove the Rear Panel Block referring to section 1-7.
(3) Remove the Power Supply Block referring to section 1-11.
(4) Remove AU-142 Board referring to section 1-9-3.
(5) Disconnect all connectors which is connected to the MB-335 Board.
(6) Remove the four screws and remove MB-335 Board.



1-10-5. VR-118 Board

(1) Remove the Front Panel referring to section 1-7.
(2) Loosen the three screws and disconnect CN503, CN504 and CN505 on KY-207 Board. Remove KY-207 Board from the chassis.
(3) Open SST-1 Board referring to section 1-9-2.
(4) Remove the eight nuts of volumes.
(5) Unsolder of the power switch.
(6) Disconnect CN551, CN552, CN553, CN554, CN555, CN556 and CN557 on VR-118 Board. Pull VR-118 Board in the direction of the arrow and remove it from the unit.

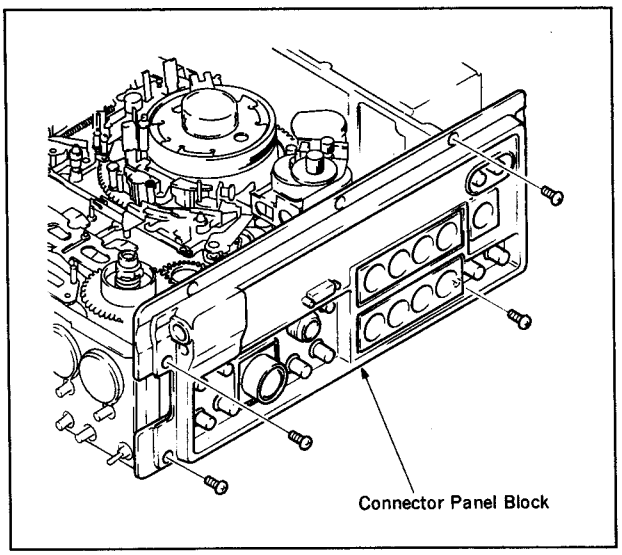


(7) After replacement, solder the power switch.

1-10-6. PC Boards of Connector Panel Block (CP-164, CC-47)

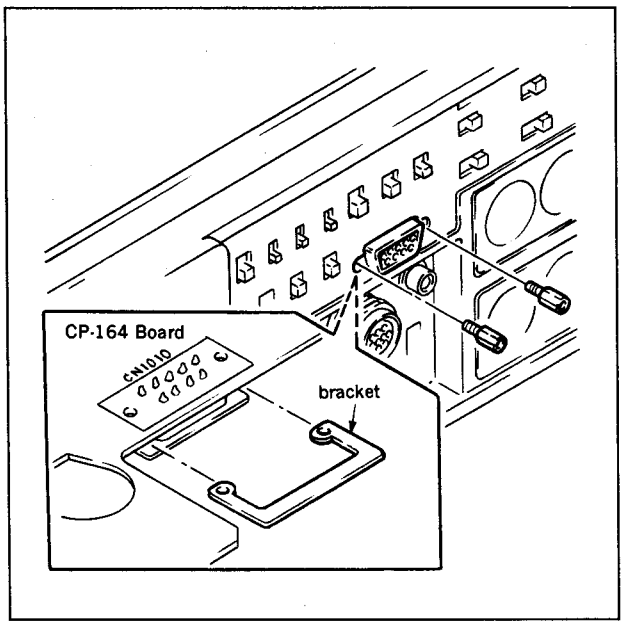
* Removal of connector panel block

(1) Remove the Top Panel, Front Panel and Rear Panel block referring to section 1-7.
(2) Remove the Cassette Compartment Block referring to section 1-8.
(3) Remove the two fixing screws and remove the Handle Ass'y.
(4) Open VRP-1 Board referring to section 1-9-1 and disconnect CC-47 Board and VRP-1 Board (CN1, CN2 and CN3).
(5) Remove the four screws as shown in the figure.
(6) Disconnect the faston terminal and CN601 from the PC Board of the Power Supply Block.
(7) Disconnect the faston terminal from FU-52 Board.
(8) Disconnect CN924, CN925, CN926, CN927, CN928 and CN929 on MB-335 Board.
(9) Disconnect CN555 and CN556 on VR-118 Board.
(10) Remove the Connector Panel Block from the unit and replace each board as follows.



1. CP-164 Board

(1) Remove the two bolts of remote connector from the outside of the Connector Panel. At this time, the bracket is removed together, do not lose it.
(2) Disconnect CN408 on CP-164 Board and CN7 on CC-47 Board.
(3) Disconnect CN404, CN405, CN406, CN407, CN409, CN412, CN413, CN416 and CN417 on CP-164 Board. Remove the nine screws and remove CP-164 Board from the Connector Panel Block.
(4) When installing CP-164 Board, place the bracket of remote connector between PC Board and connector, fix them with bolts from the outside of the Connector Panel.

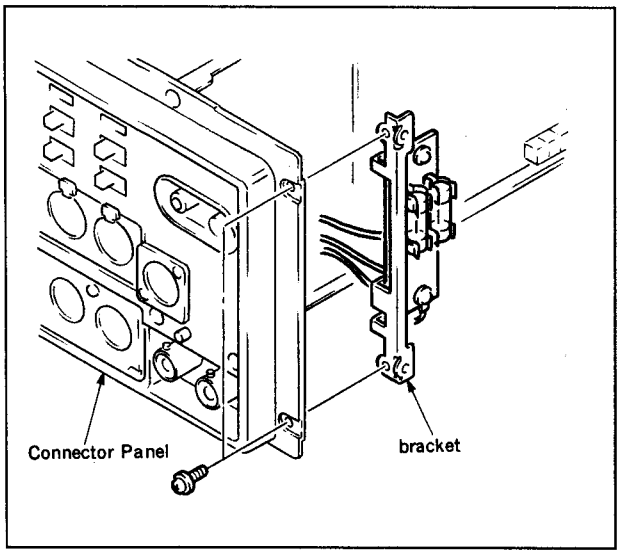


2. CC-47 Board

(1) Disconnect CN4, CN5 and CN7 on CC-47 Board.
(2) Remove the knobs and nuts of MONITOR and VIDEO LEVEL volumes from the outside of the Connector Panel.
(3) Unsolder the eight solders of BNC connectors.
(4) Remove CC-47 Board from the chassis.

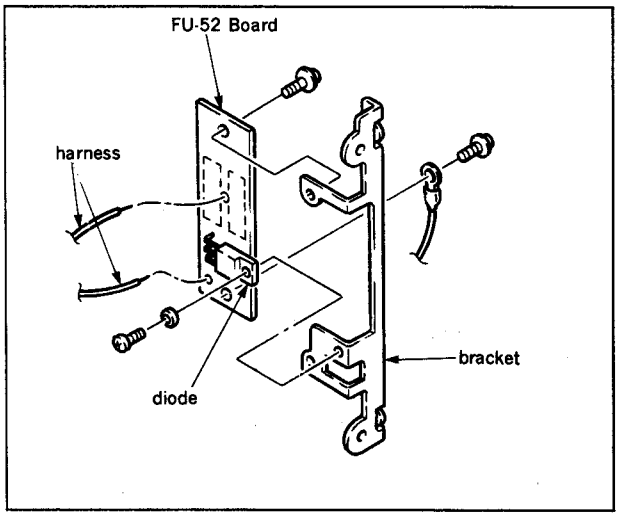
1-10-7. FU-52 Board

(1) Remove the Power Supply Block referring to section 1-11.
(2) Remove the two screws of the bracket.



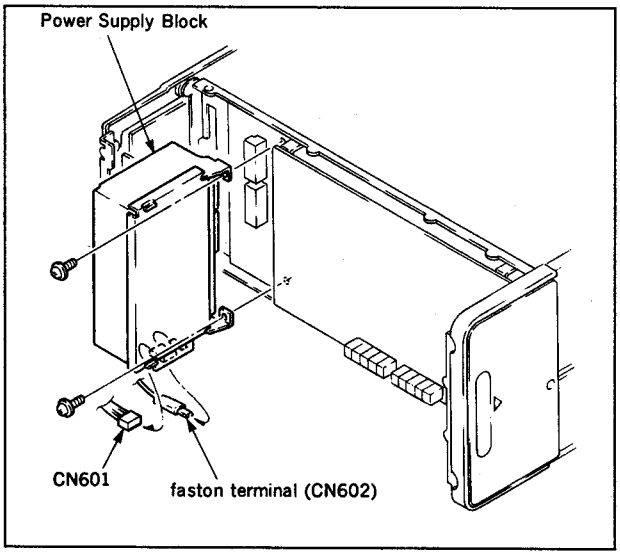
(3) Unsolder the harness and remove the fixing screw of the diode.
(4) Remove the two screws and remove FU-52 Board from the bracket.

NOTE: For replacement procedure of fuse, refer to section 1-14-2.



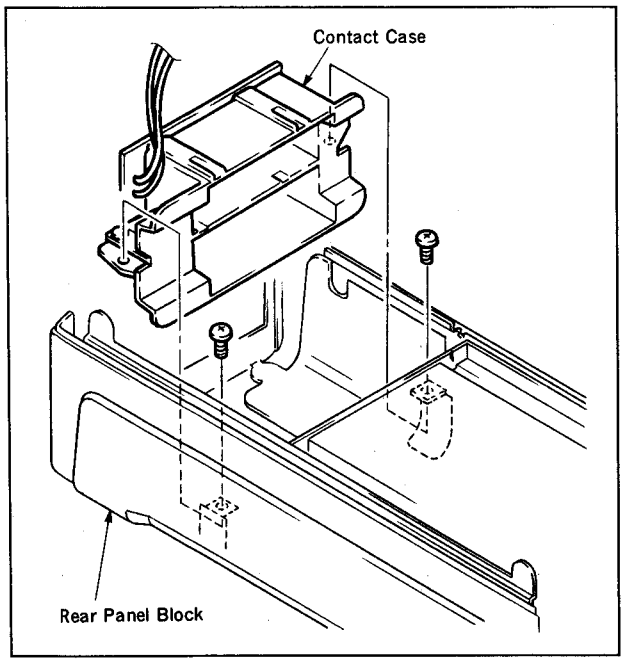
1-11. REMOVAL OF POWER SUPPLY BLOCK

(1) Remove the Rear Panel Block referring to section 1-7.
(2) Remove the two screws as shown in the figure.
(3) Disconnect CN601 and faston terminal (CN602) from PC Board of the Power Supply Block.
(4) Remove the Power Supply Block.

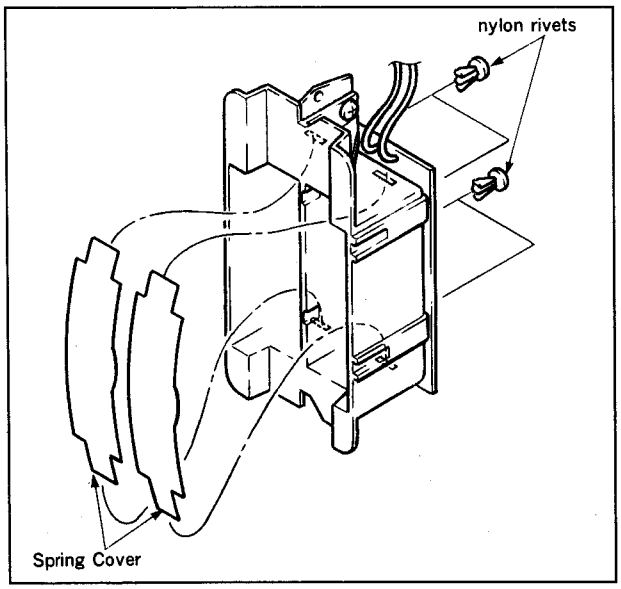


1-12. REPLACEMENT OF BATTERY TERMINALS

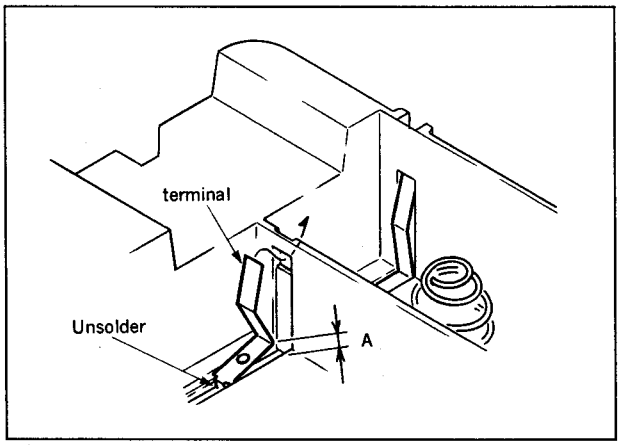
(1) Remove the Rear Panel Block referring to section 1-7.
(2) Remove the two screws and remove the Contact Case.



(3) Remove the Spring Covers.
(4) Remove the four nylon rivets.



(5) Unsolder the four solders and replace the terminals as shown in the figure. When installing the terminals, check that there is no clearance at A position.



1-13. SERVICE PARTS

1. Safety Related Components Warning
   Components marked with⚠on the schematic diagrams, exploded views and electrical spare parts list are critical to safe operation. Replace these components with Sony parts whose parts numbers appear in this manual or in service bulletins and service manual supplements published by Sony.
2. Standardization of Parts
   Repair parts supplied from Sony Parts Center may not always be identical with the parts actually in use due to 'accommodating the improved parts and/or engineering changes' or 'standardization of genuine parts'. This manual's exploded views and electrical spare parts list indicate the part numbers of 'the standardized genuine parts at present'.
3. Change of Parts
   Regarding engineering parts changes, refer to Sec.14 CHANGED PARTS.
4. Stock of Parts
   Parts marked with 'o' SP (Supply Code) column of the spare parts list are not normally required for routine service work. Orders for parts marked with 'o' will be processed, but allow for additional delivery time.
5. Units for Capacitors and Resistors
   The following units may be assumed in schematic diagrams, electrical parts list and exploded views unless otherwise specified.
   capacitors: μF
   resistors: Ω

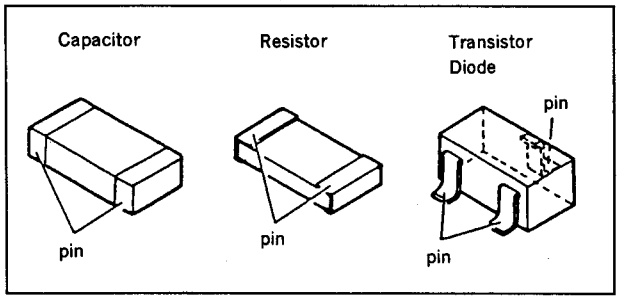
1-14. NOTES ON REPAIR PARTS

1-14-1. Replacement Procedure for Chip Parts

Tools:

- soldering iron 20W;
  If possible, use a soldering iron tip heat-controller at 270±10 °C.
- braided wire
  SOLDER TAUL or equivalent
  Sony parts No. 7-641-300-81
- solder;
  0.6 mm dia. is recommended.
- tweezers

Soldering conditions
soldering iron temperature;
270 ±10°C
soldering time;
less than two seconds per a pin



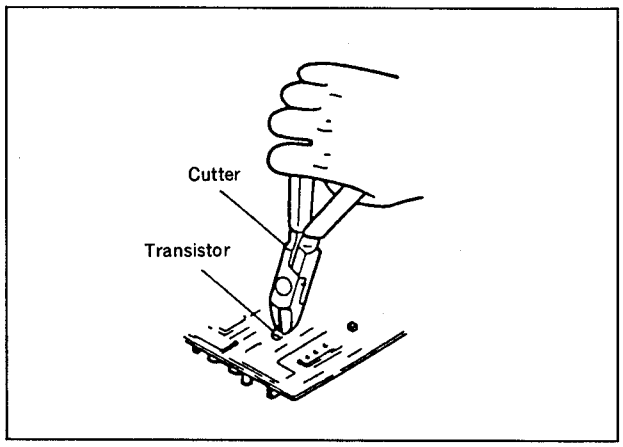
Resistor and Capacitor replacement

(1) Place the soldering iron tip onto the chip part and heat it up until the solder is melted. When the solder is melted, slide the chip part aside.
(2) Check that there is no pattern peeling, damage and/or bridges around the unsoldering positions.
(3) After removing the chip part, presolder the area where the new chip part is to be placed, with a thin layer of solder.
(4) Place new chip part on the desired position and solder both ends.

NOTE: Once a chip part has been removed, never use it again.

Transistor and Diode Replacement

(1) Cut the terminals of the chip part with cutters.
(2) Remove the cut leads.
(3) Check that there is no pattern peeling, damage and/or bridges around the unsoldering positions.
(4) After removing the chip part, presolder the area where the new chip part is to be placed, with a thin layer of solder.
(5) Place new chip part on the desired position and solder the terminals.



IC Replacement

(1) Using the braided wire, SOLDER TAUL Sony Parts No. 7-641-300-81, remove the solder around the pins of the IC-chip to be removed.
(2) While heating up the pins, remove the pins one by one using sharp-pointed tweezers.
(3) Check that there is no pattern peeling, damage and/or bridges around the unsoldering positions.
(4) After removing the chip part, presolder the area, where the new chip part is to be placed, with a thin layer of solder.
(5) Place new chip part in the desired position and solder the pins.

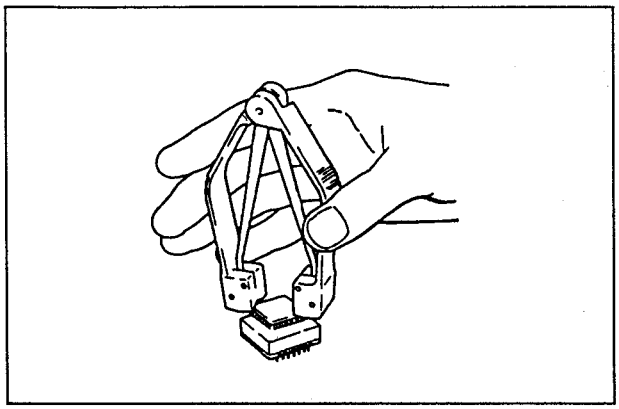
1-14-2. Replacement of Fuse

Power fuse is mounted on the FU-52 Board. When replacing the fuse, remove the foreign material (screw etc.) which causes blowing from unit.

(1) Remove the Rear Panel Block referring to section 1-7.
(2) Remove the fuse from the fuse holder and replace it with a new one.

1-14-3. Extraction Tool (for PLCC socket)

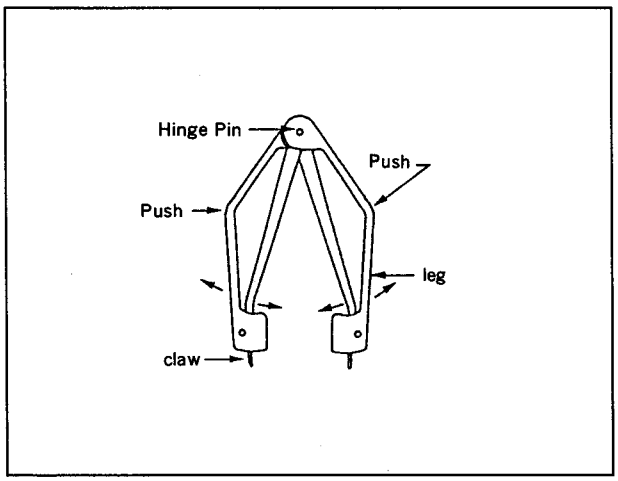
The Extraction Tool is convenient for extracting an integrated circuit of type PLCC and fits all types of ICs from 20 through 124 pins.



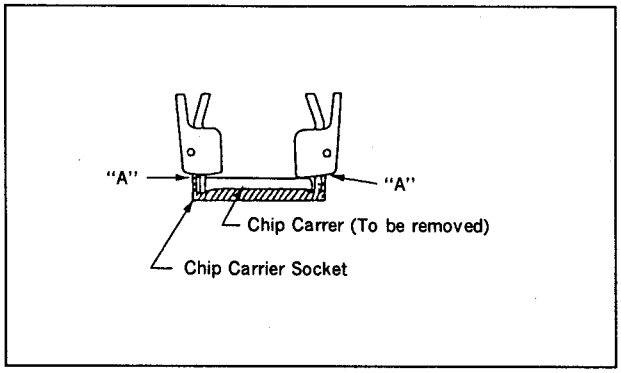
NOTE: Never pull chips of an integrated circuit upward with the Extraction Tool. Never hold the Extraction Tool on a strong force.

How to use the Extraction Tool

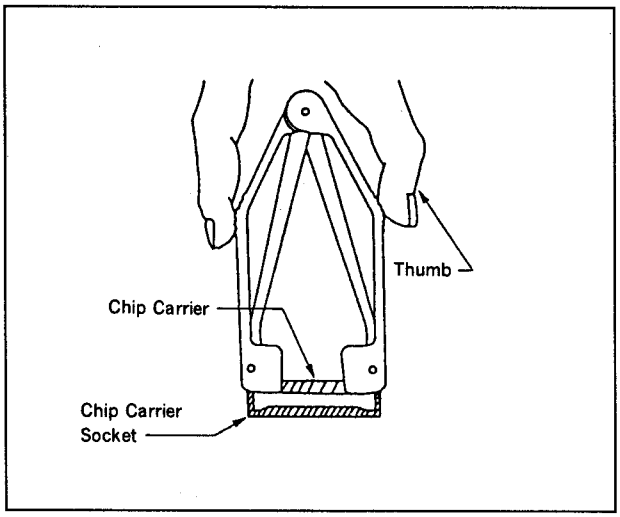
(1) Adjust width so that claws of tool are matched to a socket of an integrated circuit.



(2) Insert claws of the tool into slots of the socket, and then press the tool against the socket so that the A marked portions of the tool contact to the socket.



(3) Hold the tool with your finger as shown in figure. The socket is pressed on a little force to downward.



(4) When pinching the tool in fingers, the legs of the tool are straightened. At that time, the claws pinch the chips of the integrated circuit and pull the integrated circuit upward.

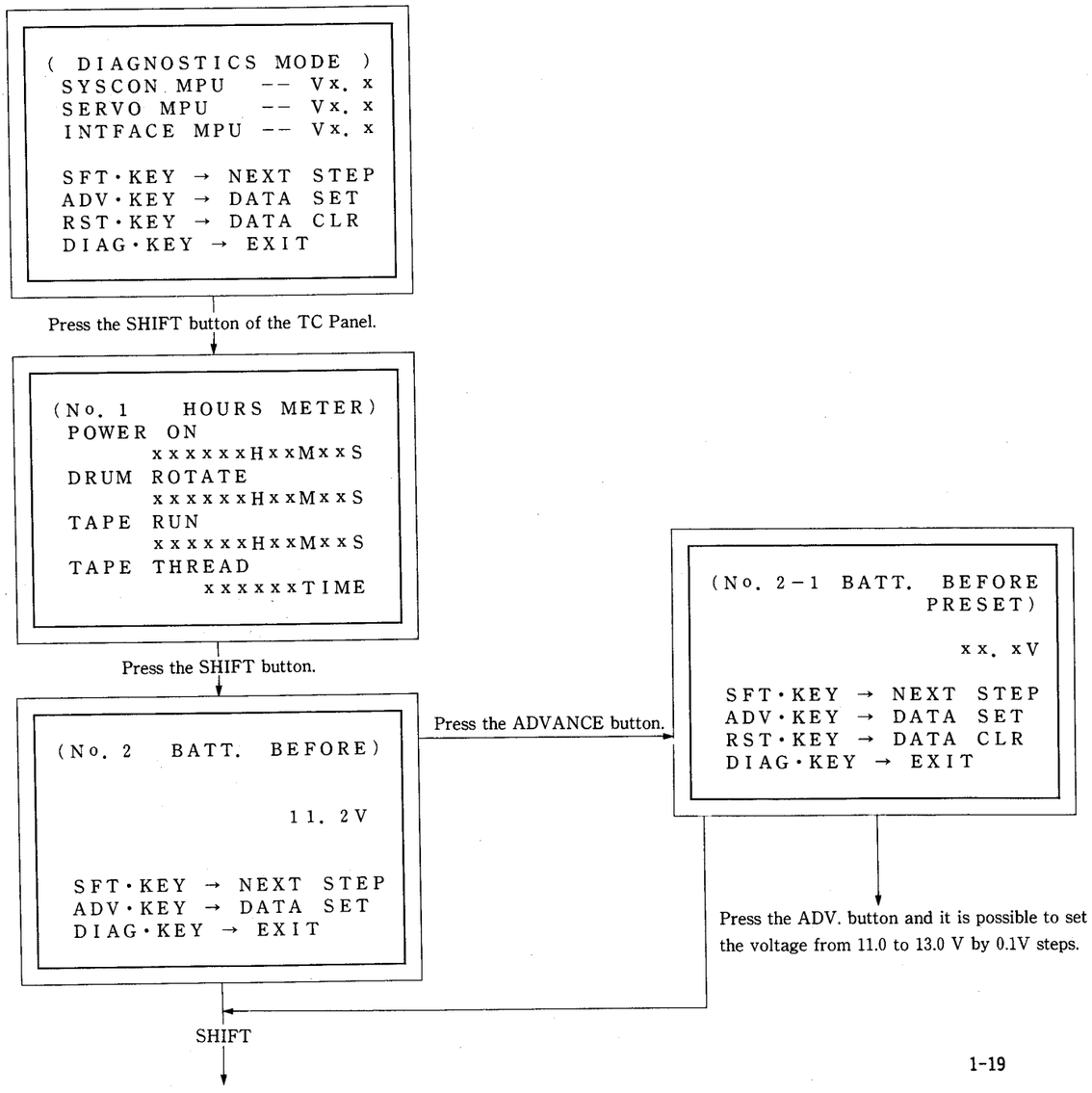
(5) After pulling the integrated circuit, loosen the force of the fingers. It is easy that the chips of the integrated circuit is extracted from the tool.

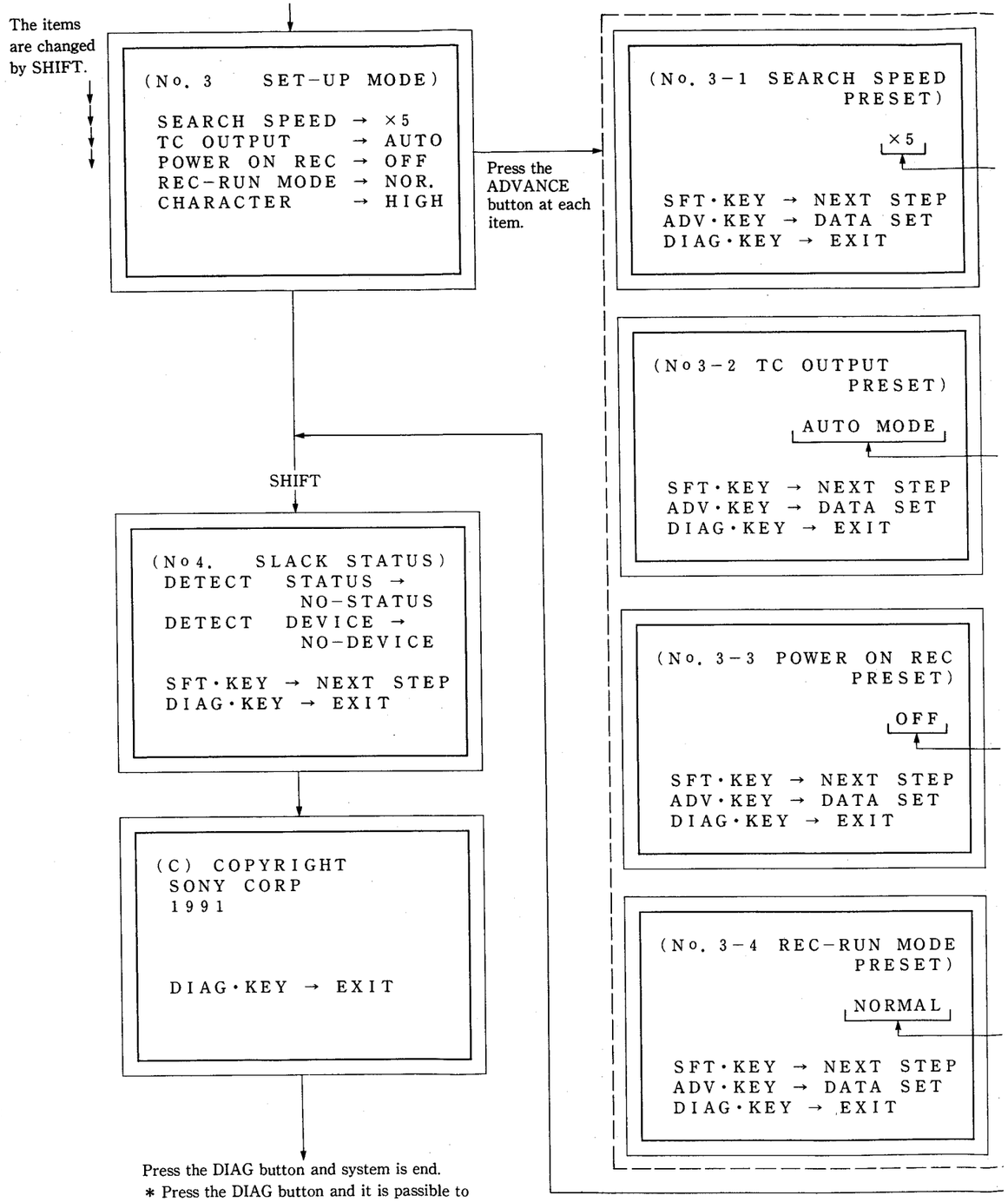
1-15. SETTING FOR SYSTEM SWITCH

The switches in the TC Panel can set and check of system setup etc..

Preparation : Set the switch of Connector Panel without a cassette tape inserting.
. MODE SW : FEEDER (PB or PB. EE)
. Connect the video monitor to VIDEO OUT 2.

Connect the Power Source and turn the power ON.
Push the DIAG button of the TC Panel with a something tapering.
DIAG is displayed at LCD and following screen is displayed at the video monitor.





The items are changed by SHIFT.

(No. 3 SET-UP MODE)

SEARCH SPEED → ×5
TC OUTPUT → AUTO
POWER ON REC → OFF
REC-RUN MODE → NOR.
CHARACTER → HIGH

Press the ADVANCE button at each item.

SHIFT

(No4. SLACK STATUS)
DETECT STATUS → NO-STATUS
DETECT DEVICE → NO-DEVICE

SFT·KEY → NEXT STEP
DIAG·KEY → EXIT

(C) COPYRIGHT
SONY CORP
1991

DIAG·KEY → EXIT

Press the DIAG button and system is end.
* Press the DIAG button and it is passible to end the system from every state.

(No. 3-1 SEARCH SPEED PRESET)

×5

×2 } select with
×5 } ADV. button

SFT·KEY → NEXT STEP
ADV·KEY → DATA SET
DIAG·KEY → EXIT

(No. 3-5 CHARACTER POSITION PRESET)

HIGH

HIGH } select with
LOW } ADV. button

SFT·KEY → NEXT STEP
ADV·KEY → DATA SET
DIAG·KEY → EXIT

(No3-2 TC OUTPUT PRESET)

AUTO MODE

GENERATOR } select with
AUTO MODE } ADV. button

SFT·KEY → NEXT STEP
ADV·KEY → DATA SET
DIAG·KEY → EXIT

(No. 3-3 POWER ON REC PRESET)

OFF

ON } select with
OFF } ADV. button

SFT·KEY → NEXT STEP
ADV·KEY → DATA SET
DIAG·KEY → EXIT

(No. 3-4 REC-RUN MODE PRESET)

NORMAL

NORMAL } select with
TAPE LOCK } ADV. button

SFT·KEY → NEXT STEP
ADV·KEY → DATA SET
DIAG·KEY → EXIT

RE
T)

xV

EP
T
R

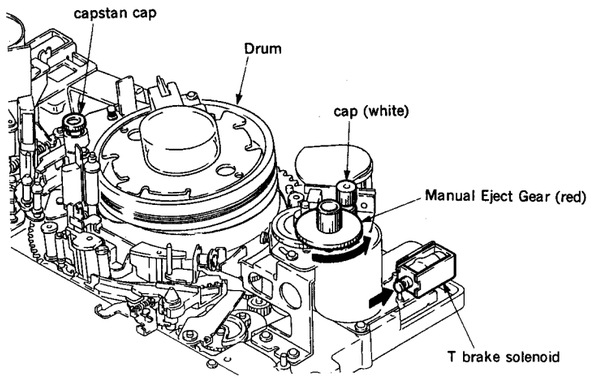
ble to set
V steps.

1-16. MANUAL EJECT PROCEDURE FOR TAPE SLACK

If either the cassette cannot be ejected or the Cassette Compartment does not rise up due to a defect, perform the following procedures to eject the cassette.

(1) Remove the Top Panel referring to section 1-7.

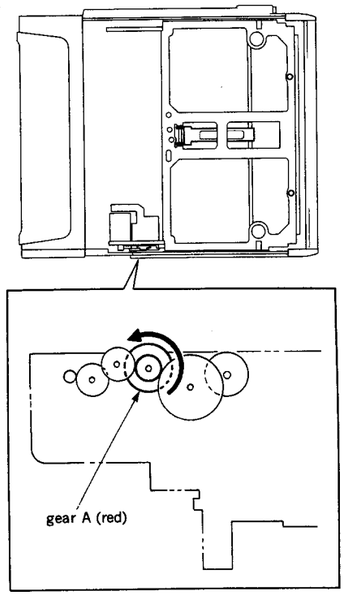
(2) While releasing the T Brake by pushing the solenoid in the direction of the arrow and turn the Manual Eject Gear (red) in the direction of the arrow. Wind up the tape in the cassette.



(3) When the tape slacks, while releasing the T Brake, turn the cap (white) of T Reel Motor in the clockwise.

(4) Turn the gear A (red) in the direction of the arrow. The cassette compartment is up and eject the cassette tape. At this time, open the front cover and it is easy to turn the gear.

NOTE: When the tape winds around the capstan shaft, turn the capstan cap and remove the tape from the shaft before performing the step (2).



1-17. TAPE PROTECTION

The unit has various detection circuits for tape protection. These detection circuits are described below.

(1) During Threading
When the unit is put into the following states during the Threading Mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and Threading operation stops.
- When UNTHREAD END SW does not turn OFF after 6 seconds from staritng the drive of the threading motor.
- When THREAD END SW does not turn ON after 6 seconds from starting the drive of the threading motor.
- When the drum rotation stops during threading and the DRUM ROTATE signal does not be generated.

(2) During F.FWD, FWD SEARCH
When the unit is put into the following states during the F.FWD or FWD SEARCH Mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and F.FWD or FWD SEARCH operation stops.
- When T Reel Table rotation stops.
- When the drum rotation stops and the DRUM ROTATE signal does not be generated.

(3) During REW, REV SEARCH
When the unit is put into the following states during the REW, REV SEARCH Mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and REW, or REV SEARCH operation stops.
- When S Reel Table rotation stops.
- When the drum rotation stops and the DRUM ROTATE signal does not be generated.

(4) During PLAY
When the unit is put into the following states during the PLAY Mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and PLAY operation stops.
- When T Reel Table rotation stops.
- When the drum rotation stops and the DRUM ROTATE signal does not be generated.
- When the capstan rotation stops and the CAPSTAN ROTATE signal does not be generated.

(5) During STOP STANDBY ON
When the unit is put into the following states during the STOP STANDBY ON Mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and STOP STANDBY ON operation stops.
- When the drum rotation stops and the DRUM ROTATE signal does not be generated.
- When the capstan rotation stops and the CAPSTAN ROTATE signal does not be generated.

(6) During PLAY PAUSE
When the unit is put into the following state during the PLAY PAUSE mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and PLAY PAUSE operation stops.
- When the drum rotation stops and the DRUM ROTATE signal does not be generated.

(7) During REC PAUSE
When the unit is put into the following state during the REC PAUSE Mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and REC PAUSE operation stops.
- When the drum rotation stops and the DRUM ROTATE signal does not be generated.

(8) During Unthreading
When the unit is put into the following states during the Unthreading Mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and Unthreading operation stops.
- When T Reel Table rotation stops.
- When the UNTHREAD END SW does not turn ON after 6 seconds from starting the drive of the unthreading motor.

(9) During change from each mode to STOP Mode
When changing from each mode to STOP Mode, the tape is reversed.When the unit is put into the following state during this time, the protection circuit operates as if the tape slack happened. The slack lamp lights and tape reverse operation stops.
- When the REVERSE STATUS signal of the capstan does not be generated.

(10) When turning the power switch ON (When the unit is not in the tape end state in the threading completion mode.)
When turning the power ON, the unit is put into the following states, the protection circuit operates as if the tape slack happened. The slack lamp lights and changing to the STOP Mode operation stops.
- When the drum rotation stops and DRUM ROTATE signal does not be generated.
- When the REVERSE STATUS signal of the capstan does not be generated.

(11) When inserting the cassette or turning power ON with cassette in, the reel rotates for winding the tape slack. When the reel rotation does not stop after 3 seconds, the protection circuit operates as if the tape is cut. The slack lamp lights and reel rotation stops.

1-17. TAPE PROTECTION

The unit has various detection circuits for tape protection. These detection circuits are described below.

(1) During Threading
When the unit is put into the following states during the Threading Mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and Threading operation stops.
- When UNTHREAD END SW does not turn OFF after 6 seconds from staritng the drive of the threading motor.
- When THREAD END SW does not turn ON after 6 seconds from starting the drive of the threading motor.
- When the drum rotation stops during threading and the DRUM ROTATE signal does not be generated.

(2) During F.FWD, FWD SEARCH
When the unit is put into the following states during the F.FWD or FWD SEARCH Mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and F.FWD or FWD SEARCH operation stops.
- When T Reel Table rotation stops.
- When the drum rotation stops and the DRUM ROTATE signal does not be generated.

(3) During REW, REV SEARCH
When the unit is put into the following states during the REW, REV SEARCH Mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and REW, or REV SEARCH operation stops.
- When S Reel Table rotation stops.
- When the drum rotation stops and the DRUM ROTATE signal does not be generated.

(4) During PLAY
When the unit is put into the following states during the PLAY Mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and PLAY operation stops.
- When T Reel Table rotation stops.
- When the drum rotation stops and the DRUM ROTATE signal does not be generated.
- When the capstan rotation stops and the CAPSTAN ROTATE signal does not be generated.

(5) During STOP STANDBY ON
When the unit is put into the following states during the STOP STANDBY ON Mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and STOP STANDBY ON operation stops.
- When the drum rotation stops and the DRUM ROTATE signal does not be generated.
- When the capstan rotation stops and the CAPSTAN ROTATE signal does not be generated.

(6) During PLAY PAUSE
When the unit is put into the following state during the PLAY PAUSE mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and PLAY PAUSE operation stops.
- When the drum rotation stops and the DRUM ROTATE signal does not be generated.

(7) During REC PAUSE
When the unit is put into the following state during the REC PAUSE Mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and REC PAUSE operation stops.
- When the drum rotation stops and the DRUM ROTATE signal does not be generated.

(8) During Unthreading
When the unit is put into the following states during the Unthreading Mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and Unthreading operation stops.
- When T Reel Table rotation stops.
- When the UNTHREAD END SW does not turn ON after 6 seconds from starting the drive of the unthreading motor.

(9) During change from each mode to STOP Mode
When changing from each mode to STOP Mode, the tape is reversed.When the unit is put into the following state during this time, the protection circuit operates as if the tape slack happened. The slack lamp lights and tape reverse operation stops.
- When the REVERSE STATUS signal of the capstan does not be generated.

(10) When turning the power switch ON (When the unit is not in the tape end state in the threading completion mode.)
When turning the power ON, the unit is put into the following states, the protection circuit operates as if the tape slack happened. The slack lamp lights and changing to the STOP Mode operation stops.
- When the drum rotation stops and DRUM ROTATE signal does not be generated.
- When the REVERSE STATUS signal of the capstan does not be generated.

(11) When inserting the cassette or turning power ON with cassette in, the reel rotates for winding the tape slack. When the reel rotation does not stop after 3 seconds, the protection circuit operates as if the tape is cut. The slack lamp lights and reel rotation stops.

1-18. SELF DIAGNOSTICS

When the power source is connected, perform the check of peripheral circuit around the system control MPU in spite of power SW state.
Correct operation case : The check is end without display. (Checking time ; 0.5 to 1 second)
Incorrect operation case : The defective point (s) is decided by assortment of indicator as described below.
(Each indicator blinks in 4 Hz.)

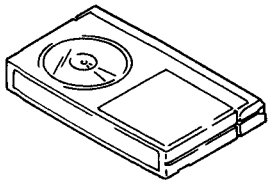
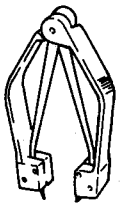
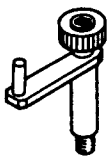
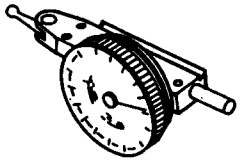
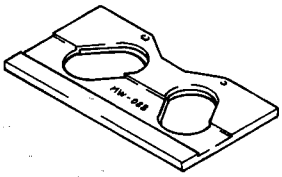
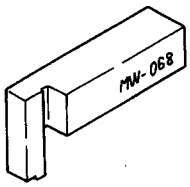
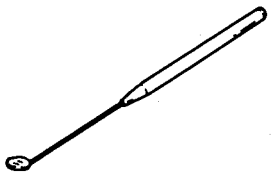
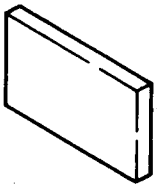
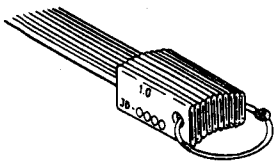
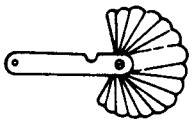
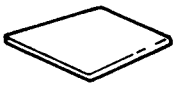
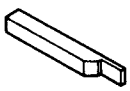
INDICATION ASSORTED			PRESUMPTIVE DEFECTIVE POINT (SST-1 BOARD)
WARNING	REC		RAM of MAIN MPU (IC6)
	RLAY		ROM of MAIN MPU (IC6)
	EJECT	REW	IC213 (INTERFACE), IC214 (TC) and these connections.
		FF	P62 (53pin) of IC6 (MAIN)
		SEARCH	P10-IC6 (3pin), P10-IC213 (37pin)
		DUB	P70-IC213 (3pin), P71-IC213 (2pin), P72-IC213 (1pin), P73-IC213 (44pin)
		PAUSE	P60-IC213 (7pin), P61-IC213 (6pin), P62-IC213 (5pin), P63-IC213 (4pin)

NOTE : How to View the Assortment of Indicator
Ex. Three indicators (WARNING-EJECT-REW) blink.

* Except for above diagnostics functions, LEDs are mounted near the three MPU (SYSCON-MAIN, INTERFACE and SERVO MAIN), and it is possible to check the function of MPU by blinking of them.
- blinking every one second for 30 mS --- correct
- blinking every half second --- incorrect

1-19. FIXTURE

Ref. No.	Parts No.	Description	Application
J-1	8-960-096-01	Alignment Tape, CR2-1B	Video tracking adjustment for recorder
J-2	8-960-069-41	Alignment Tape, CR5-1B	Video system adjustment (metal tape)
J-3	8-960-097-02	Alignment Tape, CR2-1	Video tracking adjustment for player
J-4	8-960-097-44	Alignment Tape, CR5-1A	Video system, servo system adjustment (oxide tape)
J-5	8-960-097-45	Alignment Tape, CR8-1A	Audio system adjustment (oxide tape)
J-6	J-6131-840-B	Multi Connector Cable (CIBNC)	Video system adjustment
J-7	J-6035-070-A	Extraction Tool (for PLCC socket)	Extraction of integrated circuit of type PLCC
J-8	J-6001-820-A	Upper Drum Eccentricity Adjustment Tool (3)	Upper drum eccentricity adjustment
J-9	J-6001-830-A	Upper Drum Eccentricity Adjustment Tool (2)	Upper drum eccentricity adjustment
J-10	J-6001-840-A	Upper Drum Eccentricity Adjustment Tool (1)	Upper drum eccentricity adjustment
J-11	J-6325-530-A	Upper Drum Eccentricity Adjustment Tool (6)	Upper drum eccentricity adjustment
J-12	J-6087-000-A	Upper Drum Eccentricity Adjustment Tool (5)	Upper drum eccentricity adjustment
J-13	J-6326-530-A	Cassette Reference Plate (L)	Reel table height adjustment
J-14	J-6326-750-A	Reel Table Height Gauge	Reel table height adjustment
J-15	J-6080-840-A	Small Mirror	Tape path adjustment
J-16	J-6321-500-A	Tape Guide Adjustment Driver	Tape guide height adjustment
J-17	J-6086-570-A	Reference Flat Plate	Audio/TC head zenith adjustment
J-18	J-6152-450-A	Wire Clearance Gauge Set	Clearance check
J-19	9-911-053-00	Thickness Gauge	Clearance check
J-20	9-919-573-01	Cleaning Fluid	Cleaning
J-21	2-034-697-00	Cleaning Piece	Cleaning
J-22	Standard Products	Head Demagnetizer (HE-4)	Head demagnetizing
J-23	Standard Products	Tentel Meter (T2-H7-UMC)	Back tension adjustment
J-24	J-6036-870-A	Tension Regulator Adjustment Tool	Tension regulator adjustment
J-25	J-6190-800-A	Tension Regulator Vertical Check Tool	Tension regulator slant check
J-26	3-702-390-01	Dihedral screwdriver (4ϕ)	TC Head Position Adjustment

J-1, J-2, J-3, J-4, J-5 	J-6	J-7 	J-8 
J-9	J-10, J-11 	J-12	J-13 
J-14 	J-15 	J-16	J-17 
J-18 	J-19 	J-20	J-21 
J-24 PENDING	J-25 	J-26	

1-20. An Overview of Theory of Operation

1. GENERAL DESCRIPTION

The BVW-50 Video Cassette Recorder has four recording and four playback heads on a rotating drum for luminance and chrominance signals separately.

Channel A/B playback head signal switching is performed on the rotating drum enabling the use of a six channel rotary transformer to couple the head signals between the rotating and stationary drum.

Printed circuit boards are described in section 1-5 and the wiring schematic between printed circuit boards and other components is shown in Fig. 1-20-1. The wiring connections between printed circuit boards are mainly done by MB-335 mother board except some conventional cable wire harness.

The LNG audio recording and playback heads, CONFI, CTL, TC and the full erase heads are stationary.

2. AUDIO SYSTEM

The AU-142 board contains the main part of recording, playback and control circuits for LNG audio and AFM. The reecording and playback level controls and the level meter circuits on VR-118 board,a part of level meter and its driving circuit on KY-207 board and input/output connectors and their associated circuits on CP-164 board constitute the rest of the audio system.

(1) REC mode In the REC mode, the signals from the CAMERA IN and AUDIO IN connectors are supplied to CP-164 board. One signal source of CAMERA or LINE is selected and the signal levels of −60, −20 or +4 dB are also selected in the board. The switchng which signals from the CH-3/CH-4 or CH-1/CH-2 connectors input to the AFM is also performed in CP-164 board.

When the AUDIO SELECT switch on the front panel is set to MANUAL the levels of the CH-1/CH-2 signals are adjusted by the REC LEVEL VR on VR-118 board. After the level adjustment,CH-1/CH-2 LNG audio signals input to the AU-142 board and are then encoded in the noise reduction circuit and supplied to the equalizing circuit to drive the recording heads through recording amplifiers.

When AUTO is selected by the AUDIO SELECT switch, the levels of the CH-1/CH-2 signals are adjusted automatically by the AGC/Limiter on the VR-118 board. The CH-1/CH-2 LNG audio signals then go to the AU-142 board as in the case of the MANUAL.

The high frequency bias for the LNG audio and audio erase, utilize the same reference crystal oscillator preventing harmfull beat noise in the system.

In the case of the AFM, the levels of the CH-3/CH-4 signals are adjusted by the REC LEVEL VR in the VR-118 board irrelevant to the AUDIO SELECT switch position. After the level adjustment the CH-3/CH-4 audio signals input to the AU-142 board and are then encoded in the noise reduction circuit and supplied to a limiter to modulate the frequency of two different RF carriers, 310kHz for CH-3 and 540kHz for CH-4. The RFs of CH-3/CH-4 are then mixed and supplied to the chroma recording amplifiers in VRP-1 board.

(2) PB mode In the playback mode, LNG audio signals go through the playback equalizing circuit in the AU-142 board and are then decoded in a noise reduction circuit on the same board. Since the AFM signal is played back with the chroma signal,the latter is removed by a low pass filter in the AU-142 board. The AFM RF signal which undergoes level regulation in the AGC circuit is separated into CH-3 and CH-4 RF carrier by bandpass filters and then supplied to each FM demodulator.

After decoding in the noise reduction circuit, the AFM audio signals are PB level controlled in the VR-118 board along with the LNG audio signals.

Then the signals go through the output circuit of the CP-164 board and the LNG audio signals output to the AUDIO OUT 1 and 2 connectors whereas the AFM audios output to the AUDIO OUT 3 and 4 connectors.

Stereophonic sound is employed in the HEAD/EAR PHONES OUTPUT. A switch which selects CH-1/CH-2, CH-3/CH-4 or a mix of CH-1 to CH-4 for the HEAD/EAR PHONES OUTPUT is provided on the connector panel.

3. VIDEO SYSTEM

The video system mainly consists of the VRP-1 and TBC-1 boards. In addition, CC-47 board is used for video I/O circuit and a part of KY-207 board is utilized for video/audio meter switching.

(1) VRP-1 board The recording and playback circuits of the video signal are mounted on the VRP-1 board.

In the REC mode, the signals from the CAMERA IN and LINE IN connectors are supplied to the CC-47 board. One signal source of CAMERA or LINE is selected and then REC SYNC signal is separated. The SELECT VIDEO COMPOSITE and COMPONENT signals are supplied to the VRP-1 board and are A/D converted to 8bit digital signals except the component Y signal. The composite signal is Y/C separated by 3-line correlation utilizing 2 stage FIFO (First In First Out) memory having 910 words x 8bits structure each. The separaterd digital Y signal is D/A converted to an analog Y signal. One of the separated analog Y or component Y signal is selected and goes through a slew rate limiter to modulate the frequency of Y carrier RF. The modulated Y carrier RF is finally recorded on a magnetic tape through the recording amplifiers, a rotary transformer and Y_A/Y_B recording heads.

The decoded B-Y and R-Y signals from the composite or

the component input B-Y and R-Y signals are compressed into a CTDM (Compressed Time Division Multiplex) chroma signal which is one channel signal with B-Y and R-Y separated along time axis. The CTDM chroma signal is obtained by writing B-Y and R-Y signals into memories by a clock synchronized to the input sync and then reading them out by a clock which has two times higher frequency than that used in writing.
The CTDM chroma signal also modulates the frequency of C carrier RF.
The modulated C carrier RF is frequency multiplexed with the AFM and finally recorded on a magnetic tape through the recording amplifiers, a rotary transformer and C_A/C_B recording heads.
In the Playback mode, signals from the Y_A/Y_B PB heads are amplified and switched by CH-A and CH-B in the PA-119 Board on the rotating drum, thus making PB RF Y signal. It then goes through the rotary transformer and is supplied to RF processor in the VRP-1 board.
In the processor cosine equalization, AGC (Automatic Gain Control) and DO Det (Drop Out Detection) are performed on the PB RF Y signal and the resultant output goes to a demodulator where the loss of higher frequency component caused by over modulation is compensated for by an OMC (Over Modulation Compensator). The signal is frequency demodulated and then goes to a non-linear de-emphasis circuit to become demod Y signal which outputs to TBC-19 board.
The signals from the C_A/C_B PB heads are processed almost in the same way as the Y signal and make demod C signal which also outputs to the TBC-19 board.
Reproduced composite and component signals from the TBC-19 board return to the VRP-1 board. One composite signal is amplified and goes through CC-47 board and outputs to the VIDEO OUT 1 connector. Another composite signal is mixed with character superimpose signal, amplified and outputs to the VIDEO OUT 2 connector.
Component signals are switched DUB Y/TBC Y, Y-DO/TBC R-Y, C-DO/TBC B-Y, and DUB CTDM/GND by the L : CTDM DUB signal, go through the CC-47 board and output to the DUB/COMPONENT OUT (12 pins) connector.

(2) TBC-19 board The time base correctors for the Y and C signals are provided on the TBC-19 board.
The demod Y and demod C signals from the VRP-1 Board are A/D converted to 8bit digital signals and written into two 4 x 960 x 306 bit memories respectively. The write clock is generated from sync signal derived from the demod Y or demod C respectively before A/D conversion.
On the other hand, read out clock of the memories is synchronized to the reference video sync. Thus, even if the played back video signals from the PB heads contain jitter and phase variations,you will be able to get stable video signals synchronized to the reference after time base correction. After processing dropout and edge noise the read out Y signal from the memories is D/A converted to an analog signal. This analog Y signal with sync added makes up the TBC Y signal and is supplied to the VRP-1 board.
When the CTDM chroma signal is read out from the memory, it is expanded two times longer in time axis. Drop outs in the signals are compensated and consequently, separate B-Y and R-Y signals are obtained and are D/A converted to two channel analog signals.
Time delay of chroma signal caused by Y/C separation and CTDM is compensated for by advancing read out timing from that of the Y signal.
The converted analog B-Y and R-Y signals go through clamp circuits and output to the VRP-1 board separately as component signals.
At the same time, the analog B-Y and R-Y signals respectively modulate U/V axis subcarriers which are derived from either an external or internal subcarrier. The modulated subcarriers are mixed to make the chroma signal and then encoded in the NTSC format with Y signal and output to the VIDEO OUT 1 and 2 connector through the VRP-1 board.

4. SERVO SYSTEM

The servo system is composed of the drum, capstan and reel servos.
The inputs and outputs of these servos are handled by a newly developed servo IC, CXD 2202. This servo IC is controlled by a 16bits internal, 8bits external CPU, thus closing the servo loops. The servo IC, CPU and associated circuits are mounted on SST-1 board together with the SYSTEM CONTROL circuits.
Pulse signals such as capstan and threading FG's, drum PG, PB SYNC and ENCODE SYNC are supplied to the FRC(Free Running Counter) inputs of the servo IC after processing noise component. These signals are then written into FIFO (First In First Out) buffers attached with time of occurence for each pulse.
The CPU then reads out from the FIFO in time sequence. The output of the S reel and T reel FG, the capstan FG and CTL signals are supplied to the counter input of the servo IC. To the input ports of the se-rvo IC, discretes such as thread end, un-thread end, large/small cassette and metal/oxide tape detection are applied.
The servo IC generates output pulse signals such as Y SWP, C SWP,$Y_{A,B}$ REC, $C_{A,B}$ REC, PWM (Pulse Width Modulation) signals to control the drum, capstan,threading, S reel and T reel motors and drives the plungers of PINCH, S BRAKE and T BRAKE.
The tension of the magnetic tape is controlled by applying control torques to the S reel motor. The control torques are derived from tension sensor analog signal which is taken into

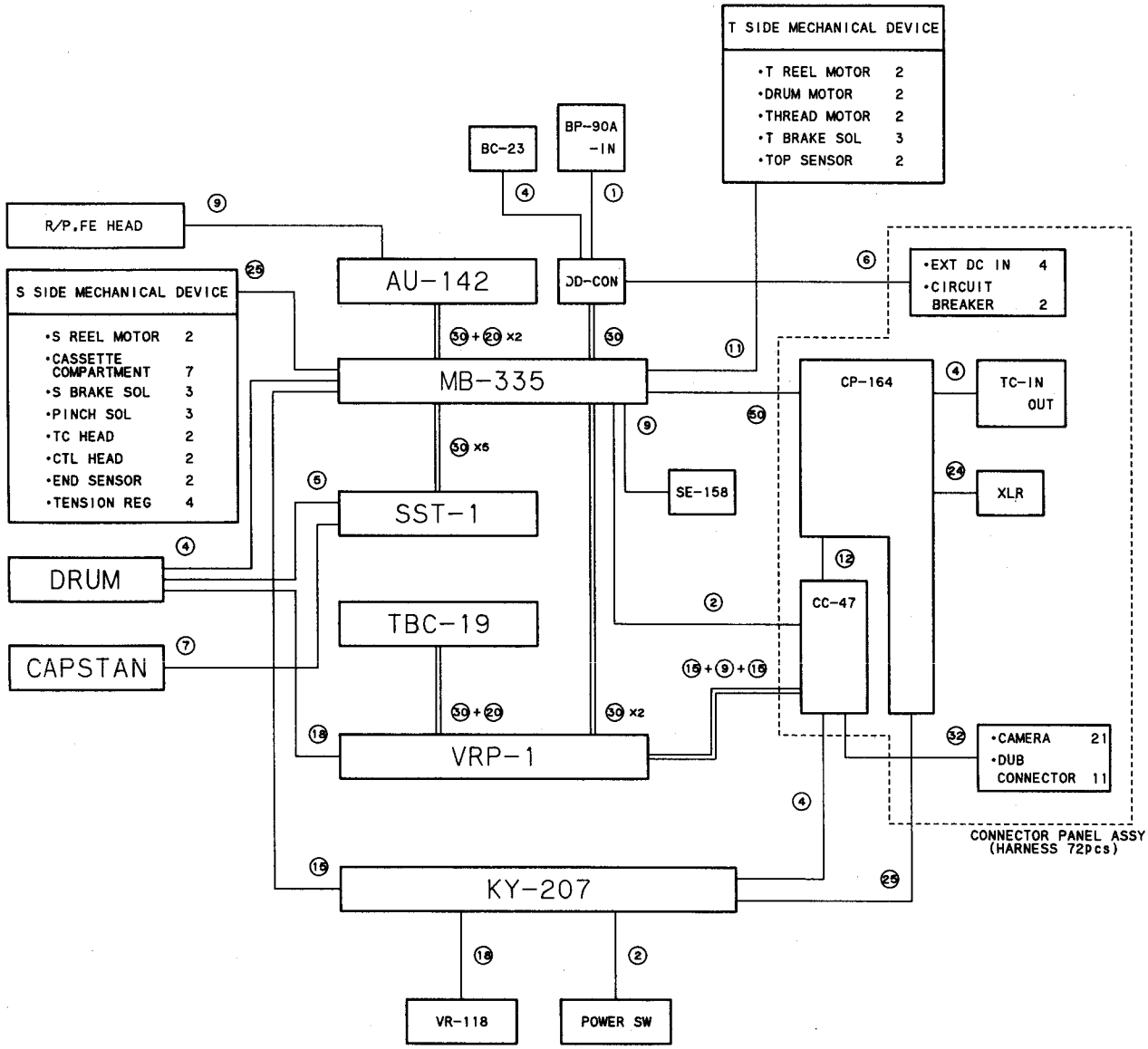
the tension control loop by an A/D converter on the CPU. The execution program of the CPU is stored in a 64k bytes ROM. The CPU has a 2k bytes RAM and a nonvolatile RAM for holding automatic adjustment parameters. In addition, the CPU has a 4 bit microcomputer connected to its I/O port for communicating with the SYSTEM CONTROL CPU.
For the automatic adjustment of the capstan and tension servos, an 8 bit D/A converter is provided which receives adjustment signals from the CPU through serial communication port and outputs the signals to the inputs of these servos.

5. SYSTEM CONTROL

The mechanical, electrical, parameter setting and failure diagonosis systems are managed by the SYSTEM CONTROL. As long as electric power is connected to the Recorder, the SYSTEM CONTROL is performing its function even while the power switch is off consuming very low power. The LCD display, control switches such as PLAY, REC, FF, REW etc. and their LED lamps on the front panel are installed on the KY-207 board. The on/off states of these switches are dynamically scanned and are taken into the system control 16bit microcomputer on the SST-1 board.
This microcomputer has a 32k byte ROM and a 1k byte RAM and is connected to the tape beginning/end sensor, condensation sensor, power switch and DC-DC ON discretes and character generator for super impose through I/O ports and I/O expander. The microcomputer is also connected to the time code controller by eight bit parallel line and to the servo CPU through 4bit communication microcomputer. Besides, RS-422 tranceiver circuit for remote control is connected to the SYSTEM CONTROL 16bit microcomputer.
In addition to the system control and servos the REC/PB circuit of the time code are provided on the SST-1 board.

6. POWER SYSTEM

The electric power of the recorder is supplied mainly by PSW-12 DC/DC converter directly connected to the MB-335 mother board. Since the actuation of the DC/DC converter should be controlled by the system control, a switching regulator is mounted on the SST-1 board to supply +5Vdc to the system control and servos.
In order to reduce power consumption in the system, power of each circuit of each board is system controlled and the power of unnecessary circuits for a mode being selected is cutoff by electronic switches located in each circuit. For instance, power of the TBC-19 board is shutdown in the REC mode because recording is not in need of time base corrector. The power for the photo sensor of the threading FG is let off except when threading the tape.
The PSW-12 DC/DC converter converts 12Vdc input into +9, +5, −9, −5, and +48Vdc for microphone phantom power by five switching regulators of just the same type. The PSW-12 has a under voltage detection circuit. When a voltage under specified voltage is detected, it sends a signal to the SYSTEM CONTROL 16bit microcomputer which in turn stops the operation of the DC/DC converter.
The input power goes through FU-52 board which is a non-interrupting power switching circuit between the external power and the internal batteries. In using the external power, conventional switching circuit tends to consume some internal battery power. In BVW-50 recorder, improved switching circuit prevents such unnoticeable power consumption by sharpening switching characteristics.



※ ═══: CONNECTED BY BOARD TO BOARD CONNECTORS
※ ——: CONNECTED BY WIRE HARNESS

Fig. 1-20-1 WIRING CONNECTION SCHEMATIC

SECTION 2
PERIODIC INSPECTION AND MAINTENANCE

2-1. SYSTEM CONTROL OPERATION CHECK

It is recommended that the following check is performed daily before operation. After the check, be sure to reset the switches for use system.

2-1-1. Playback Function Check

Equipment : (1) Recorded tape (Video, Audio CH-1/CH-2/CH-3/CH-4, Time code)
Never use an alignment tape.
(2) Video/Audio Monitor
(3) Fully charged battery

Switch Setting : (1) DISPLAY switch : CTL
(2) MONITOR selector : CH-1 to CH-4 ; ON
(3) TRACKING control : clicked position

ORERATION	CHECK POINT
Insert a fully charged battery.	
Turn the power ON.	..... The HUMID lamp does not light. The BATT. INDICATOR is positioned at the right side from center.
Insert a cassette tape.	..... The tape is in the Threading mode.
Press the F. FWD button.	..... The tape is advanced rapidly. The time counter display counts up figure.
Press the STOP button.	..... The tape running is stopped.
Press the RESET button.	..... The figure on the time counter return to "0 : 00 : 00 : 00".
Press the PLAY button.	..... The tape runs in the forward direction. The playback picture is displayed on the monitor.
Press the PAUSE button.	..... The STILL picture is displayed on the monitor.
Press the PAUSE button again.	..... The STILL picture is released and the tape runs in the forward direction. The playback picture is displayed on the monitor.
Set the meter select switch (PUSH VIDEO) to AUDIO.	
Turn the AUDIO PB LEVEL control knob of the CH-2 clockwise.	..... The pointer of CH-2 side level meter deflects. The sound of audio channel 2 is heard from the monitor.
Turn the AUDIO PB LEVEL control knob of the CH-2 counterclockwise.	
Turn the AUDIO PB LEVEL control knob of the CH-1 clockwise.	..... The pointer of CH-1 side level meter deflects. The sound of audio channel 1 is heard from the monitor.
Turn the AUDIO PB LEVEL control knob of the CH-1 counterclockwise.	
Check the CH-3 and CH-4 side in the same way with a cassette tape recorded the AFM signal.	
Press the SEARCH button.	..... The STILL picture is displayed on the monitor.
Press the F. FWD button.	..... The high-speed playback picture (monochrome) in the forward direction is displayed.
Press the REW button.	..... The high-speed playback picture (monochrome) in the reverse direction is displayed.
Press the STOP button.	..... Tape running is stopped.
Set the DISPLAY switch to U-BIT.	..... The U-BIT is displayed if it is recorded.
Set the DISPLAY switch to TC.	
Press the PLAY button.	..... The time code is displayed and counted up.
Press the REW button.	..... The time code is counted down rapidly and the tape is rewound. The tape is stopped automatically at the tape top.
Press the EJECT button.	..... The cassette tape is ejected.

2-1-2. REC Function Check in LINE Signal

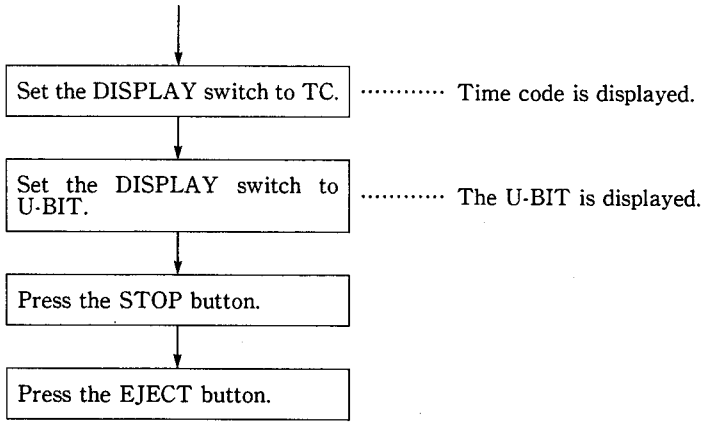
This check should be performed after Playback Function Check.

Equipment and Setting :
(1) Video Tape
(2) Connect the video signal to VIDEO IN connector on the Connector Panel.
Connect the audio signal to AUDIO connector on the Connector Panel.
(3) Video/Audio Monitor

Switch Setting :
(1) DISPLAY switch : TC
(2) MONITOR selector : CH-1 to CH-4 ; ON
(3) AUDIO REC LEVEL AUTO/MAN selector : AUTO
(4) AUDIO IN selector : LINE
(5) AUDIO-IN level selector : Set the input level
(6) LINE/CAMERA selector : LINE (VIDEO IN switch)
(7) F-RUN/R-RUN selector : R-RUN
(Set the U-BIT to suitable value)

OPERATION	CHECK POINT
Insert a cassette tape.	
Press the REC button.	..... The EE picture is displayed on the monitor. The EE sound is also heard.
Press the meter select switch (PUSH VIDEO).	..... The pointer of the rightest meter is in the middle of the blue zone. The other three meters (Y, R-Y, B-Y) do not deflect.
Take your hand off from the meter select switch (PUSH VIDEO).	..... The pointers of CH-1 and CH-2 meters deflect to audio input level.
Set the AUDIO REC LEVEL AUTO/MAN switch to MAN.	
Adjust the AUDIO REC LEVEL control knob of CH-2 so that the pointer indicates "0".	
Adjust the AUDIO REC LEVEL control knob of CH-1 so that the pointer indicates "0".	
Set the AFM INPUT switch to CH-1/CH-2.	..... (Only when using a metal cassette tape.)
Adjust the AUDIO REC LEVEL control knob of CH-3 so that the pointer indicates "0".	..... (Only when using a metal cassette tape.)
Adjust the AUDIO REC LEVEL control knob of CH-4 so that the pointer indicates "0".	..... (Only when using a metal cassette tape.)
Press the REC button and PLAY button at the same time.	..... The recording starts and time code is counted up.
Press the PAUSE button.	..... The unit is put into the PAUSE mode. Time code counter is stopped.
Press the PAUSE button again.	..... The recording starts and time code is counted up again.
Set the KEY INHIBIT switch to ON.	
Press any button on the Front Panel.	..... The recording mode can not be released.
Set the KEY INHIBIT switch to OFF.	
Press all the buttons except the STOP and PAUSE buttons.	..... The recording mode can not be released.
Press the STOP button.	..... The recording mode is released.
Press the REW button.	
Rewind the tape to the beginning of record start point, press the PLAY button.	..... The video and audio CH-1/CH-2 (CH-3 and CH-4 is only when using a metal cassette tape) is recorded correctly.
Press the REC button.	..... The EE picture/sound is displayed on the monitor during only when pressing the REC button.

2-2

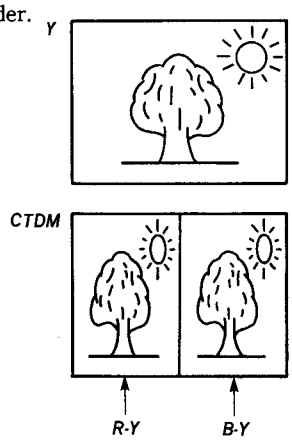

Set the DISPLAY switch to TC.
..... Time code is displayed.
Set the DISPLAY switch to U-BIT.
..... The U-BIT is displayed.
Press the STOP button.
Press the EJECT button.

2-1-3. Record Function Check in CAMERA Signal

Equipment :
(1) Video camera (Connect the 26P connector)
(2) Video Tape
(3) Video/Audio Monitor

Switch Setting :
(1) DISPLAY switch : CTL
(2) Monitor selector : CH-1 to CH-4 ; ON
(3) AUDIO REC LEVEL AUTO/MAN selector : AUTO
(4) AUDIO IN selector : CAMERA
(5) VIDEO IN selector : CAMERA
(6) CONFI selector ; Y

OPERATION	CHECK POINT
Insert a cassette tape.	
While pressing the REC button, press the PLAY button.	..... The unit is in the STANDBY mode.
Press the VTR START/STOP button of the camera.	..... The recording starts.
Press the VTR START/STOP button again.	..... The recording is stopped. The EE picture is remained in the view finder.
Press the RET button of the camera.	..... The playbacked picture is displayed in the view finder.
Set the CONFI switch to C.	..... The CTDM picture is displayed in the view finder.
Press the STOP button of VTR.	
Playback the recorded portion.	..... Recording is performed correctly.
Press the EJECT button.	



2-1-4 Audio Dubbing Function Check

Equipment and Setting:

(1) Recorded tape
Never use an alignment tape.
(2) Connect the audio signal to AUDIO IN CH-1 and CH-2.
(3) Video/Audio Monitor.

Switch Setting:

(1) DISPLAY switch: CTL
(2) MONITOR selector: CH-1/CH-2; ON
(3) AUDIO REC LEVEL AUTO/MAN selector: MAN
(4) AUDIO IN selector: LINE
(5) DUB switch: CH-1 or CH-2

OPERATION	CHECK POINT
Insert a recorded cassette tape.	
Press the PLAY button and PAUSE button at the same time.	
Press the AUDIO DUB button.	
Adjust the AUDIO REC LEVEL control knob of CH-1 or CH-2 so that the pointer indicates "0". (* 1)	..... The EE sound of CH-1 or CH-2 is heard.
Press the PAUSE button.	..... The unit is into the AUDIO/DUB mode.
Press the STOP button.	
Playback dubbing portion of the audio signal.	..... The audio signal is dubbed to AUDIO CH-1 or CH-2.
Press the EJECT button.	

(* 1)
Adjust the AUDIO REC LEVEL of the channel selected with the DUB switch. When checking the both channels, adjust one by one.

(a) Turn the PAUSE button ON/OFF. Repeat the AUDIO dubbing in both channels.
or
(b) Change the channel with the DUB switch during the dubbing, and check that the audio is dubbed in both CH-1 and CH-2.

2-2. PERIODIC INSPECTION

Perform the periodic checks and maintenance in order to ensure correct function and performance and also to extend the life of tape and unit.
Perform the following maintenance before using the unit.

- Clean the tape running surfaces and slider running surface.
  (Refer to section 2-4.)
- Tracking check (Refer to section 4)

2-2-1. Hours Meter

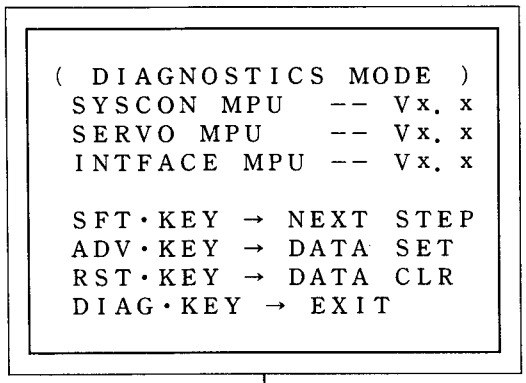
It is recommended that the periodic inspection is performed referring to hours meter as a standard.

How to Display the Hours Meter

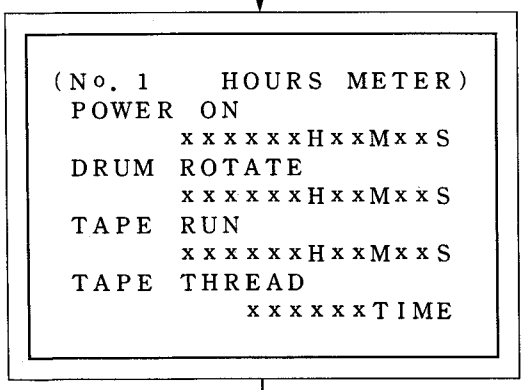
Preparation Set the switch without a cassette tape inserting.
Mode SW : FEEDER (PB or PB/EE)
Connect the video monitor to VIDEO OUT 2.

OPERATION

1. Connect the Power Source and turn the power ON.
2. Push the DIAG button of the TC Panel with a something tapering. DIAG is displayed at LCD and following screen is displayed at the video monitor.


(DIAGNOSTICS MODE)
SYSCON MPU -- Vx. x
SERVO MPU -- Vx. x
INTFACE MPU -- Vx. x
SFT・KEY → NEXT STEP
ADV・KEY → DATA SET
RST・KEY → DATA CLR
DIAG・KEY → EXIT

Press the SHIFT button of the TC Panel.



Press the DIAG button and HOURS METER MODE is end.

NOTE : It is impossible to reset or set the setting of hours meter display.

2-2-2. Periodic Inspection Items

The table below shows the schedule for periodically inspecting the main parts. The items shown in the tables are not the guaranteed lives of the parts.
The cleaning, adjustment and replacent periods depend on the conditions of use, so refer to this table when making up a maintenance and inspection plan.

○ : cleaning, ◎ apply oil/greasing up, △ check/adjustment, ☆ replacement

ITEM	PART NO.	INSPECTION HOURS (H) : DRUM ROTATE											
		500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000
DRUM ASS'Y (DBH-21-R)	A-6050-765-A	○	○	○	☆	○	○	○	☆	○	○	○	☆
UPPER DRUM ASS'Y (DBR-21-R)	A-6762-451-A	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
BRUSH ASS'Y	A-6050-786-A	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
SLIP RING	A-6050-788-A	○	☆	○	☆	○	☆	○	☆	○	☆	○	☆
PINCH ROLLER	X-3165-756-1 (PINCH ARM ASSY)	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
AUDIO/TC HEAD (EPS244-2103B)	8-825-623-21	○	○	○	☆	○	○	○	☆	○	○	○	☆
AUDIO/CONFI HEAD (PS244-2103C)	8-825-771-11	○	○	○	☆	○	○	○	☆	○	○	○	☆
CTL HEAD (PS244-21B)	8-825-554-83	○	○	○	☆	○	○	○	☆	○	○	○	☆
DRUM BELT	3-172-003-01	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
REEL BELT (S/T)	3-172-003-01	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
THREADING BELT	3-676-303-00	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
CAPSTAN MOTOR (SCV-0201A)	8-835-437-01				☆				☆				☆
PLUNGER SOLENOID (S/T REEL BRAKE)	1-454-334-41				☆				☆				☆
PLUNGER SOLENOID (PINCH ROLLER)	1-454-383-11				☆				☆				☆

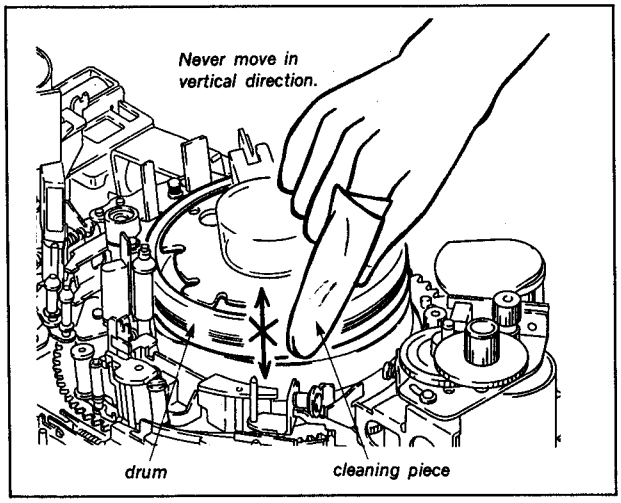
2-3. CLEANING

Perform the cleaning as the following procedures.
After cleaning, insert a cassette tape after cleaning fluid evaporate completely.

2-3-1. Video Head

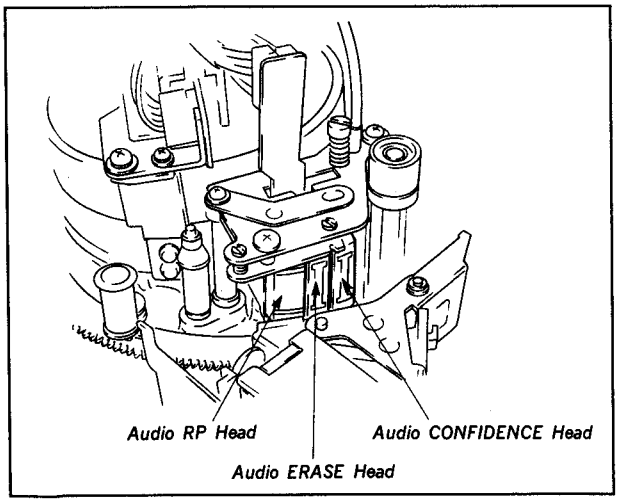
While pressing the cleaning piece moistened with cleaning fluid lightly, and turn the drum slowly by hand.

NOTE: 1. Never move the cleaning piece in the vertical direction of the head tip.
2. Perform the cleaning in the power OFF mode.



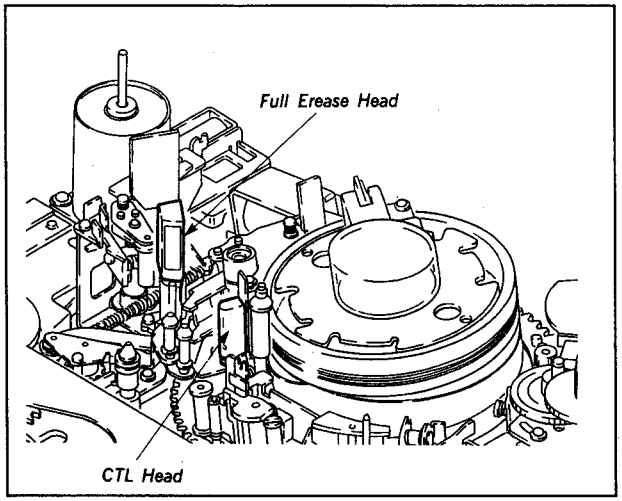
2-3-2. Audio RP/ER/CONFI Head

Clean the heads with a cleaning piece moistened with cleaning fluid.



2-3-3. CTL/Full Erase Head

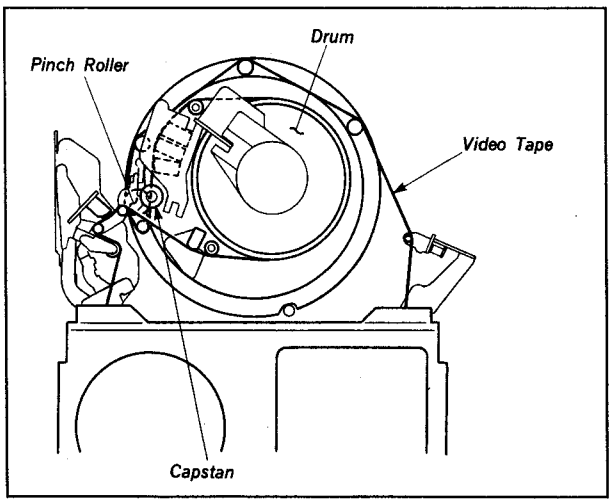
Clean the heads with a cleaning piece moistened with cleaning fluid.



2-3-4. Tape Path Surface

Clean the parts which contact with video tape with a cleaning piece moistened with cleaning fluid.

- Tape guides
- Upper and lower drum
- Capstan
- Pinch roller etc.



SECTION 3
REPLACEMENT AND ADJUSTMENT OF MAJOR PART

3-1. GENERAL INFORMATION FOR PARTS REPLACEMENT

1. When replacing parts on the upper surface of the chassis

Preparations before replacing parts :

Perform the following items before replacing parts.

(1) Turn the power off.
(2) Remove a Top Panel. (Refer to Sec. 1-8.)
(3) Remove a Cassette Compartment. (Refer to Sec. 1-9.)

Note : These items are omitted from parts replacement procedures.

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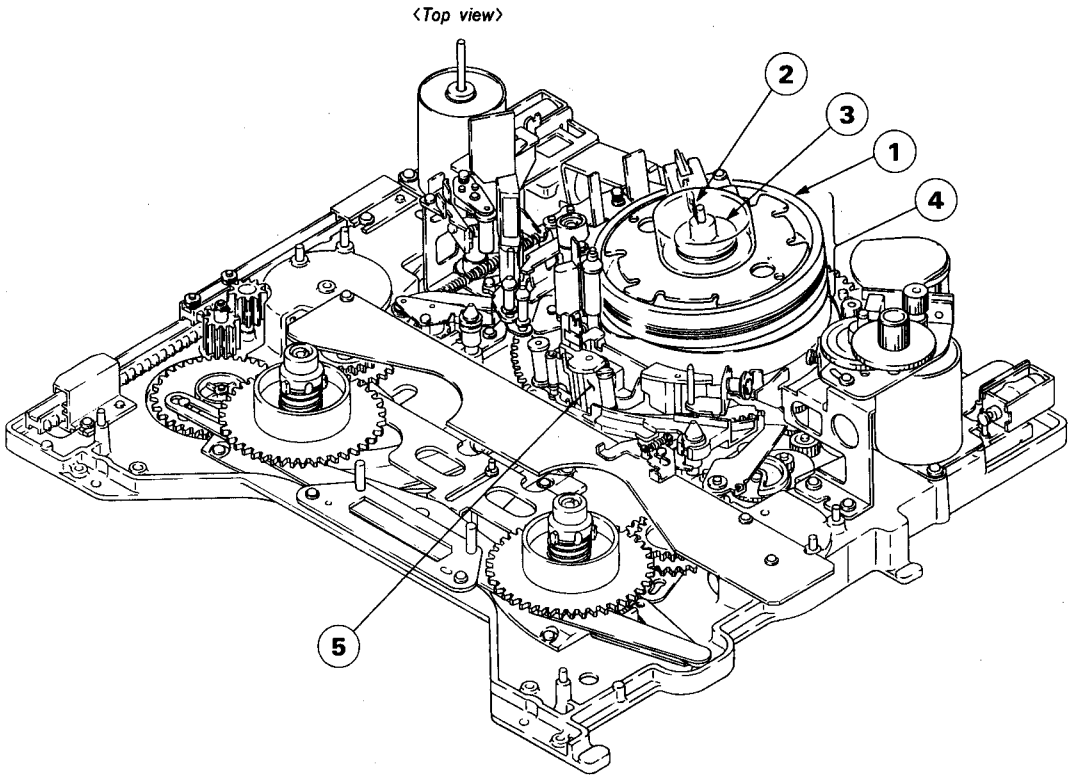


No.	Description	Title	Page
①	Upper Drum Assembly	3-2. Replacement of Upper Drum Assembly	3-6
②	Brush Assembly	3-3. Replacement of Brush Assembly	3-12
③	Slip Ring Assembly	3-4. Replacement of Slip Ring Assembly	3-15
④	Drum Assembly	3-5. Replacement of Drum Assembly	3-17
⑤	Pinch Roller	3-9. Replacement of Pinch Roller	3-23

2. When replacing parts on the back surface of the chassis

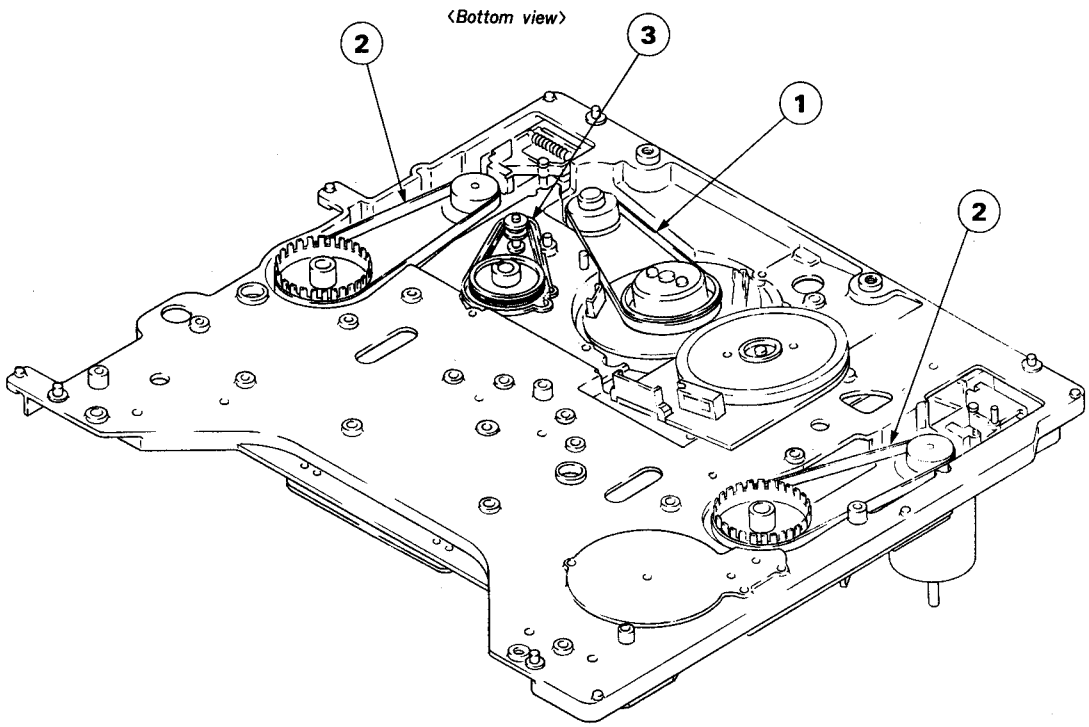
Preparations before replacing parts :

Perform the following items before replacing parts.

(1) Turn the power off.
(2) Place the unit with a Rear Panel Block side down.
(3) Remove a Bottom Panel. (Refer to Sec. 1-8.)
(4) Open VRP-1 board. (Refer to Sec. 1-10-1.)
(5) Open SST-1 board. (Refer to Sec. 1-10-2.)
(6) Remove a Belt Cover.

Note : These items are omitted from parts replacement procedures.

Index

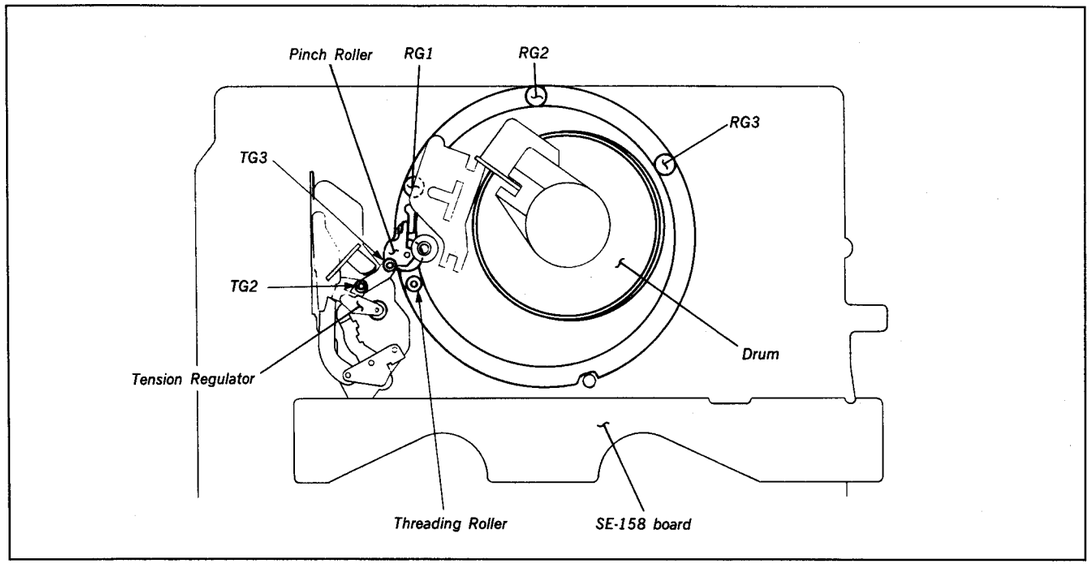


No.	Description	Title	Page
①	Drum Belt	3-6. Replacement of Drum Belt	3-20
②	Reel Belt	3-7. Replacement of Reel Belt	3-21
③	Threading Belt	3-8. Replacement of Threading Belt	3-22

3. Threading end mode and unthreading end mode

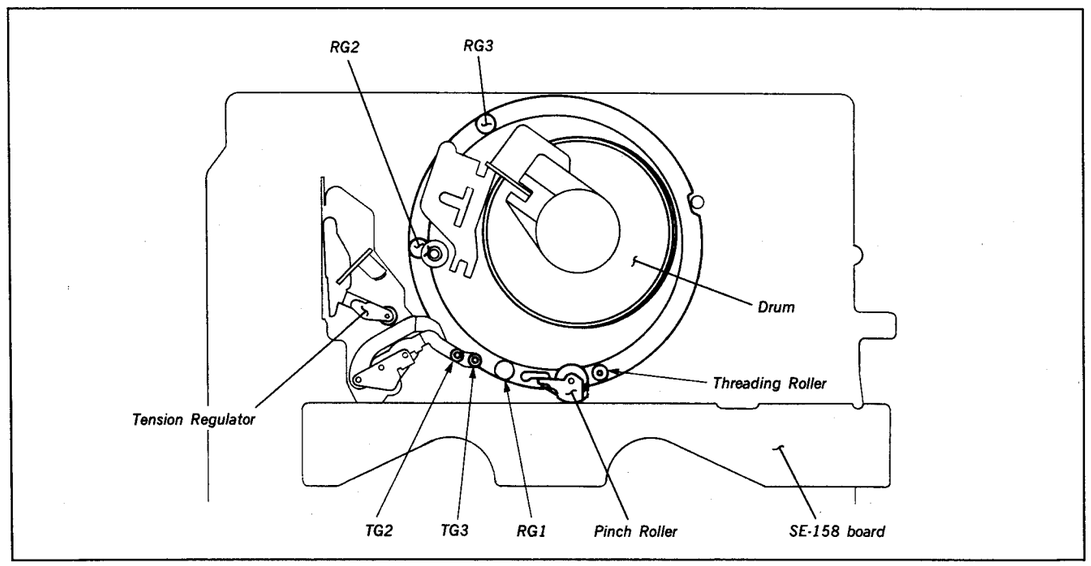
Threading end mode :

It means that the Threading Ring rotates in the counterclockwise direction, then stops rotation.



Unthreading end mode :

It means that the Threading Ring rotates in the clockwise direction, then stops rotation. (EJECT completion mode)



How to put the unit into the threading end mode :

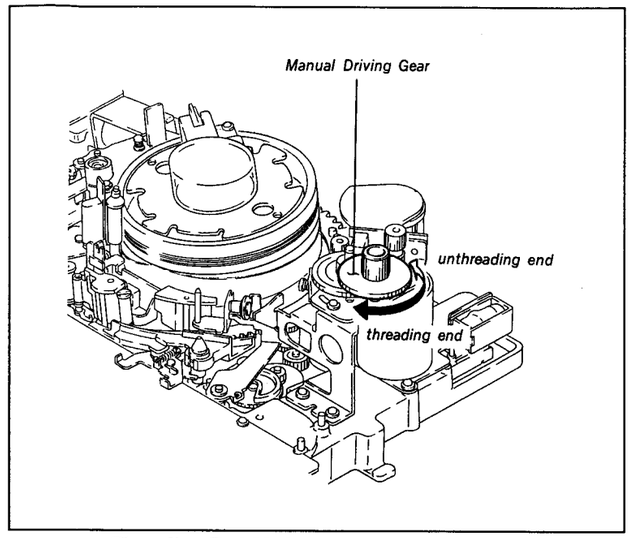
Method 1 : Turn the power on.

Method 2 : Turn the knob of Manual Driving Gear in the clockwise direction while pressing down it.

How to put the unit into the unthreading end mode :

Method 1 : Press the EJECT button in the threading end mode.

Method 2 : Turn the knob of Manual Driving Gear in the counterclockwise direction while pressing down it.

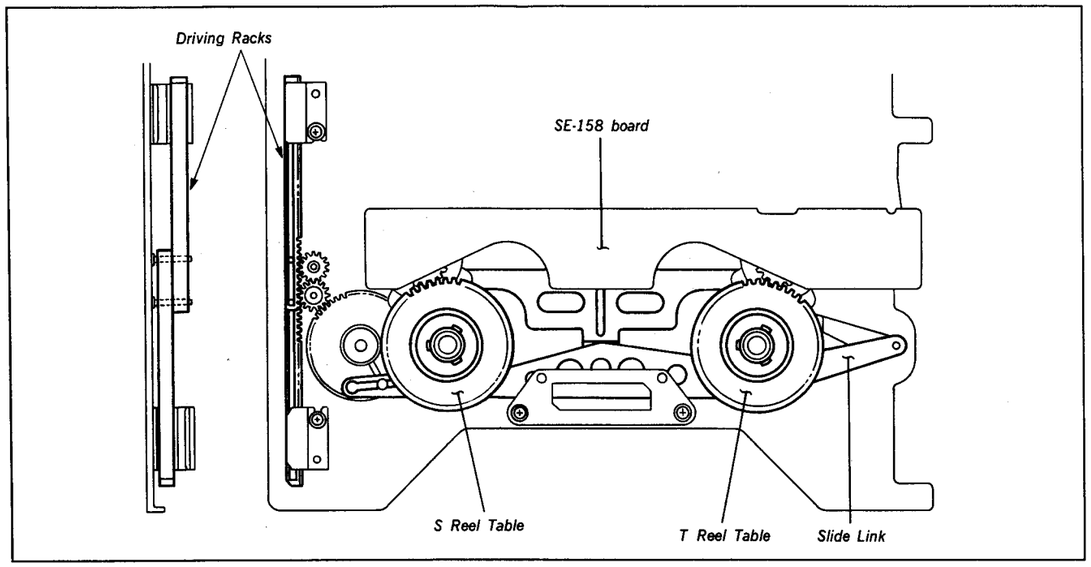


Threading End Mode/Uuthreading End Mode

4. **L cassette position, S cassette position and intermediate position between L and S cassette positions**

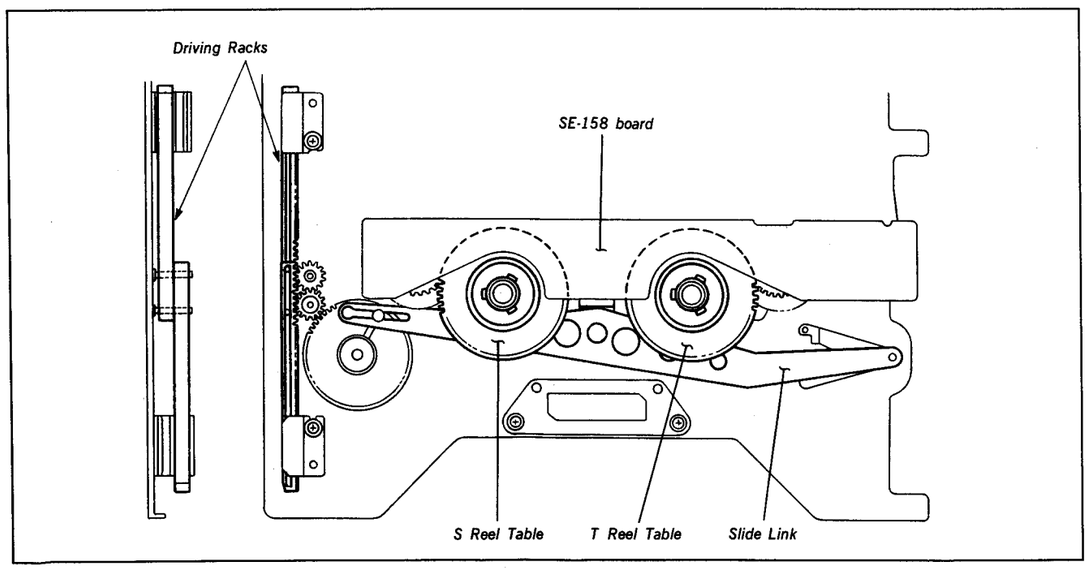
L cassette position:

It means that the Reel Tables are in the position of L cassette.



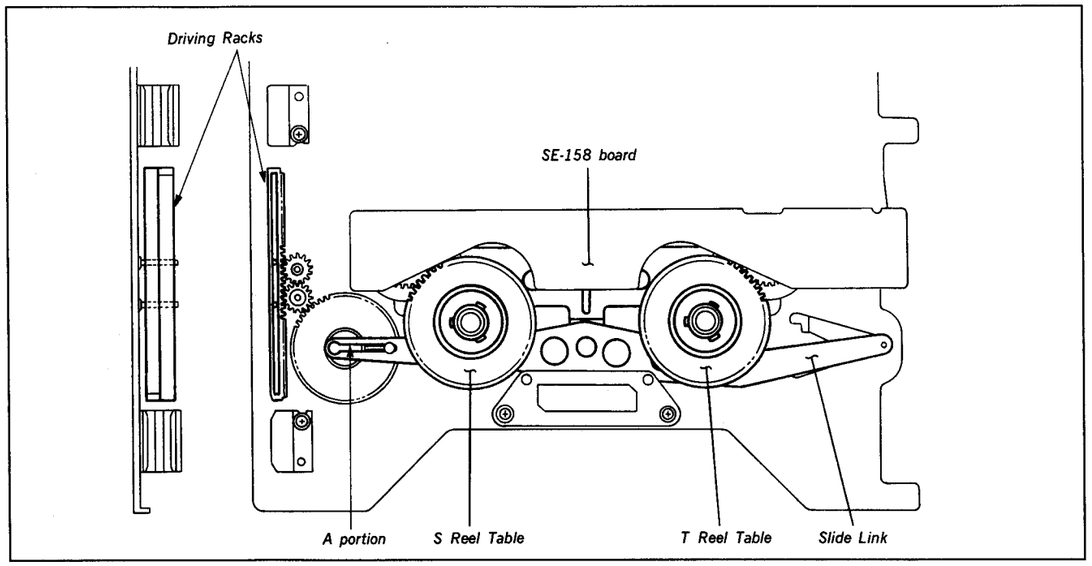
S cassette position:

It means that the Reel Tables are in the position of S cassette.



Intermediate position between L and S cassette positions:

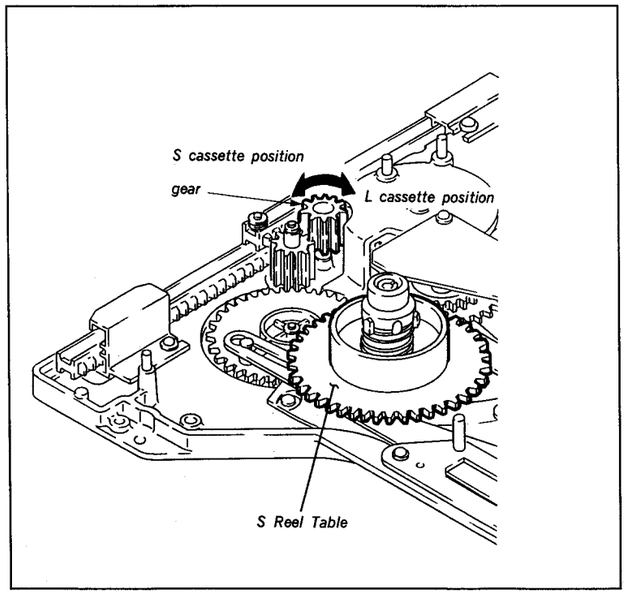
It means that the positions of two Driving Racks are the same place, and the A portion of the Slide Link parallels to the unit. (Refer to the following below figure.)



How to put the unit into the L cassette position, S cassette position and intermediate position between L and S cassette positions :

Turn a gear as shown in the figure until the Reel Tables shift to the desired position.

Note : If a cassette tape is inserted, the Reel Tables can not be shifted.

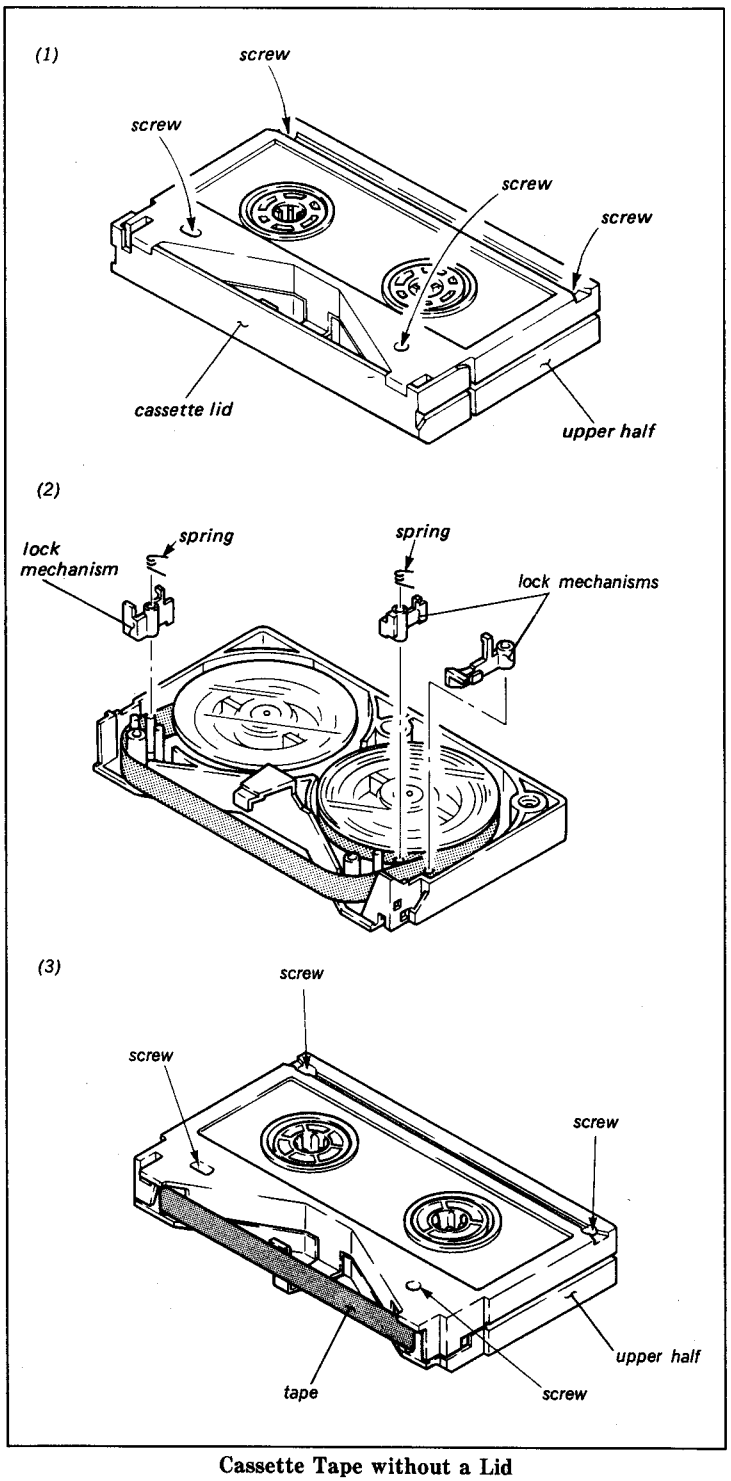


L Cassette Position/S Cassette Position/Intermediate Position Between L and S Cassette Positions

5. How to make the cassette tape without a lid

Since this unit is designed to be compact, the check and adjustment cannot be performed if a cassette tape lid is installed. Remove the cassette tape lid as follows :

(1) Remove four screws on the back of the cassette tape as shown in the figure, and remove the upper half of the cassette.
(2) Remove the lock mechanism parts and the springs on the left and right.
(3) Remove the cassette lid from the upper half.
(4) Install the upper half on the lower half with four screws from the back side.



Cassette Tape without a Lid

3-2. REPLACEMENT OF UPPER DRUM ASSEMBLY

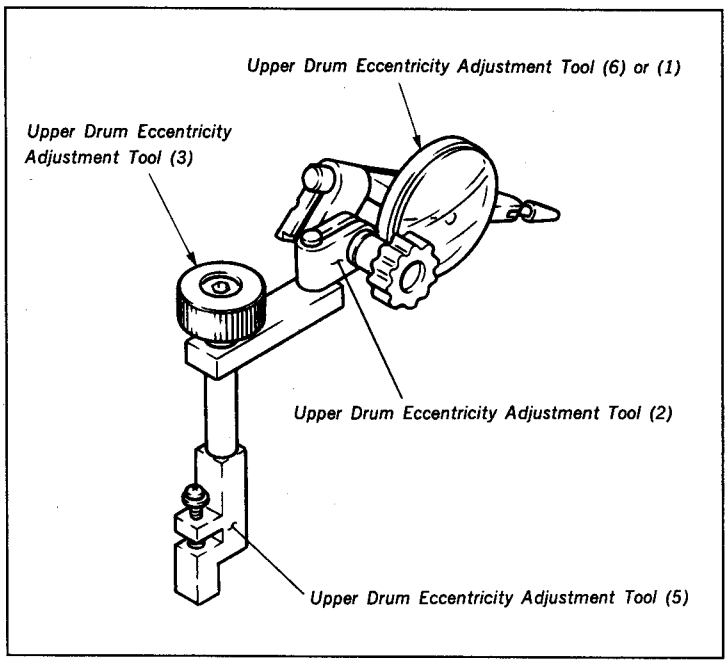
- Replace an Upper Drum Assembly when the video heads are worn or damaged. The unit's performance cannot be guaranteed when PA-119 board on the Upper Drum is replaced (removed or installed). Be sure to replace the Upper Drum Assembly.

- If a spacer exists on the flange surface when the Upper Drum Assembly is removed, keep it left on the flange surface. Do not lose the spacer or replace it by a spacer with different thickness. This disorders the height of the video head from a reference surface and cannot get interchangeability.

Fixture :

Upper Drum Eccentricity Adjustment Tool (2)
Upper Drum Eccentricity Adjustment Tool (3)
Upper Drum Eccentricity Adjustment Tool (5)
Upper Drum Eccentricity Adjustment Tool (6) or (1)

*Use the Upper Drum Eccentricity Adjustment Tools in combination as shown in the figure.


Upper Drum Eccentricity Adjustment Tool (6) or (1)
Upper Drum Eccentricity Adjustment Tool (3)
Upper Drum Eccentricity Adjustment Tool (2)
Upper Drum Eccentricity Adjustment Tool (5)

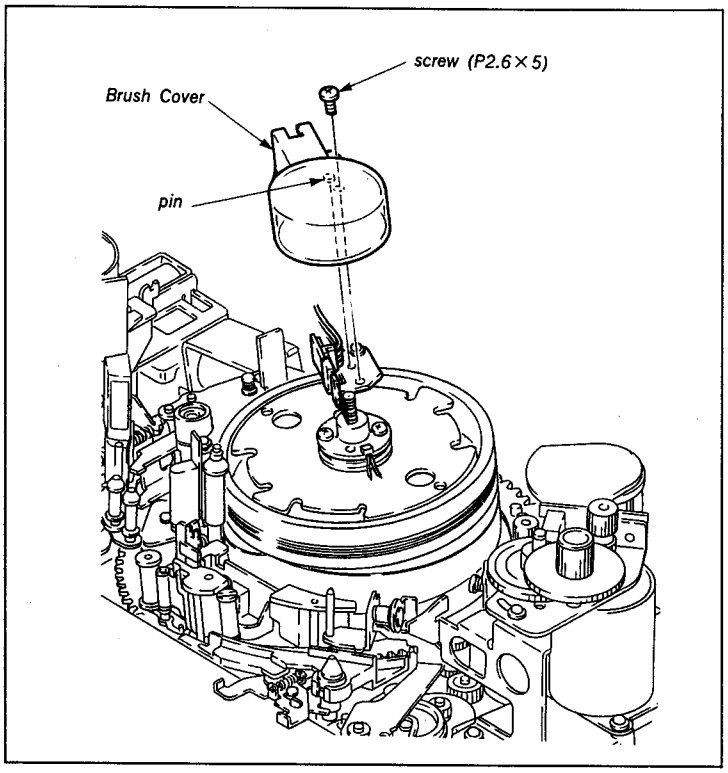
Upper Drum Eccentricity Adjustment Tool

Removing procedure :

1. Loosen a screw (P2.6 x 5) shown in the figure, and remove a Brush Cover.

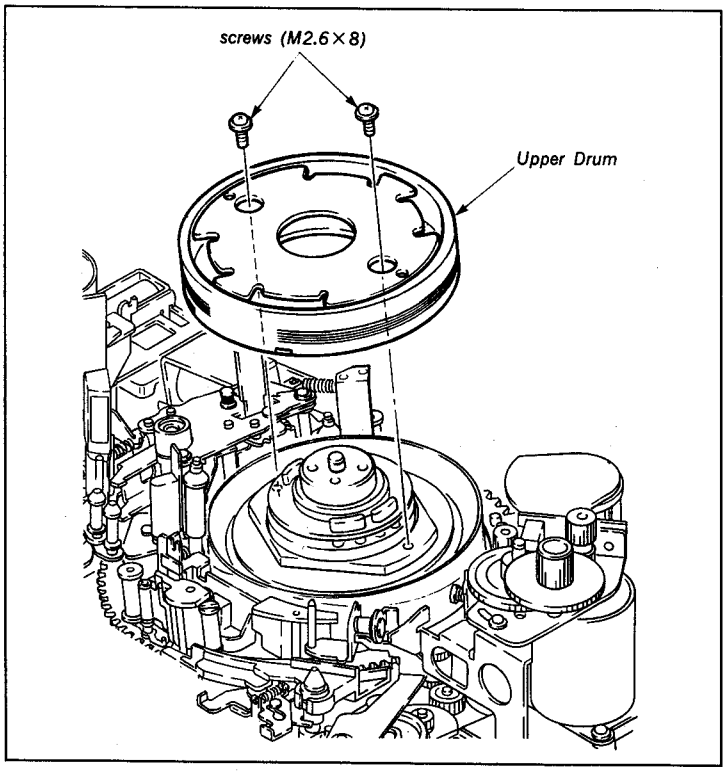
2. Remove a Brush Assembly.
   (Refer to Sec. 3-3.)

3. Remove a Slip Ring Assembly.
   (Refer to Sec. 3-4.)



Removal of the Brush Cover

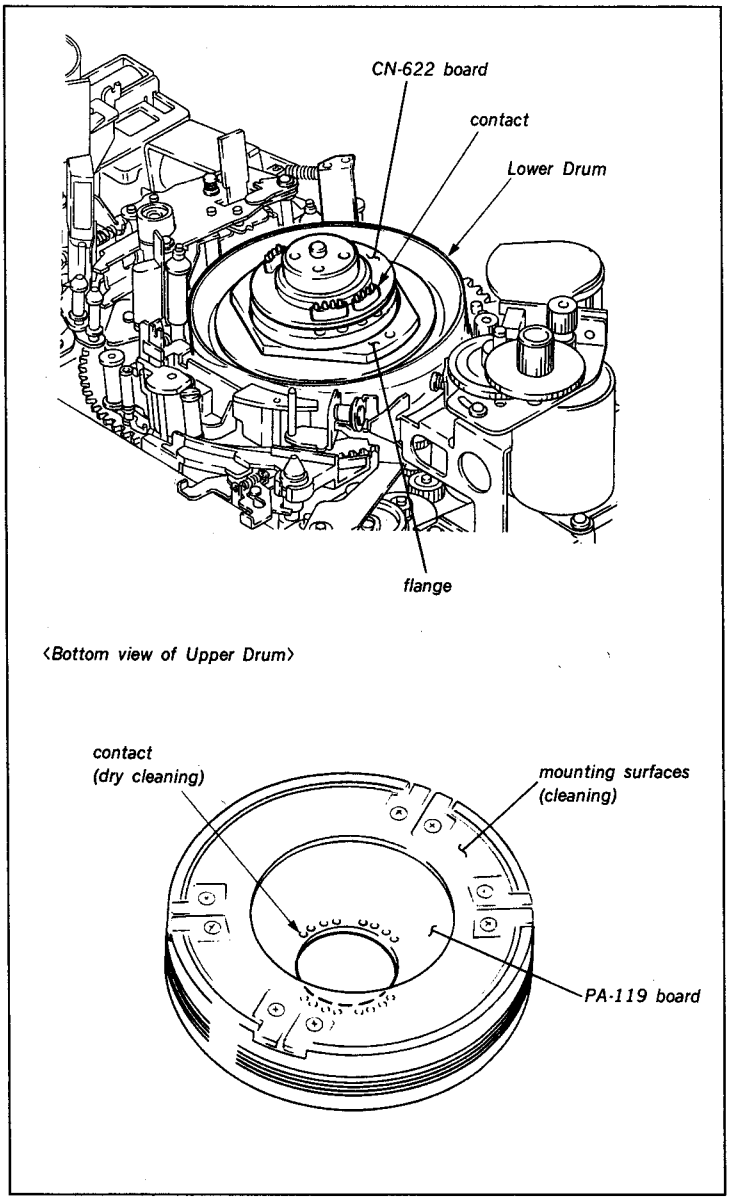
4. Remove two screws (M2.6 x 8) fixing the Upper Drum Assembly and pull out it just upwards.



Removal of the Upper Drum Assembly

Installing procedure:

5. Perform the cleaning.
   (1) Clean the flange surface of the Lower Drum and the mounting surface of a new Upper Drum Assembly with a cleaning piece moistened with cleaning fluid.
   (2) Clean the contacting surfaces of CN-622 board on the flange and PA-119 board on the Upper Drum with dry cleaning piece.

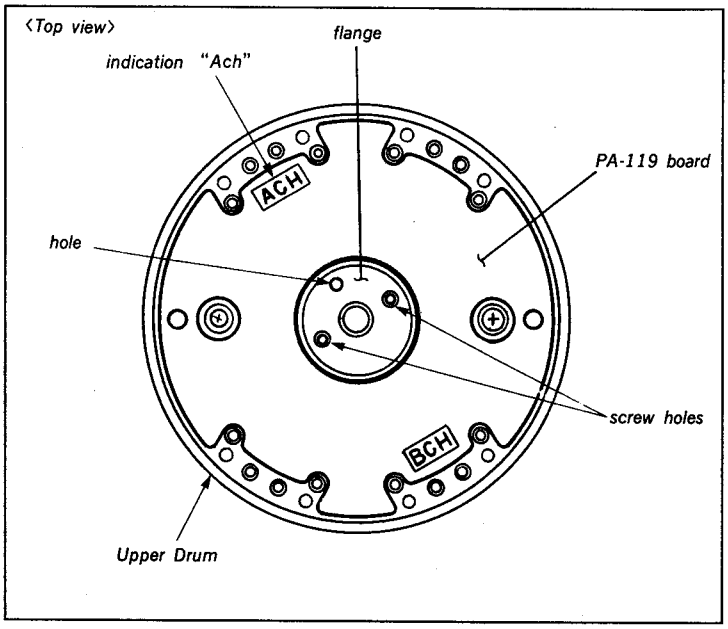


Cleaning

6. Set the "Ach" display on PA-119 board to the side of the hole shown in the figure of a flange and install the Upper Drum Assembly tentatively on the Lower Drum Assembly with two screws (M2.6 x 8) .

Caution 1: Be careful not to damage the tape running surface of the Upper Drum and the video heads when installing the Upper Drum Assembly on the Lower Drum. Moreover, take care not to damage the tape guides around the Drum Assembly.

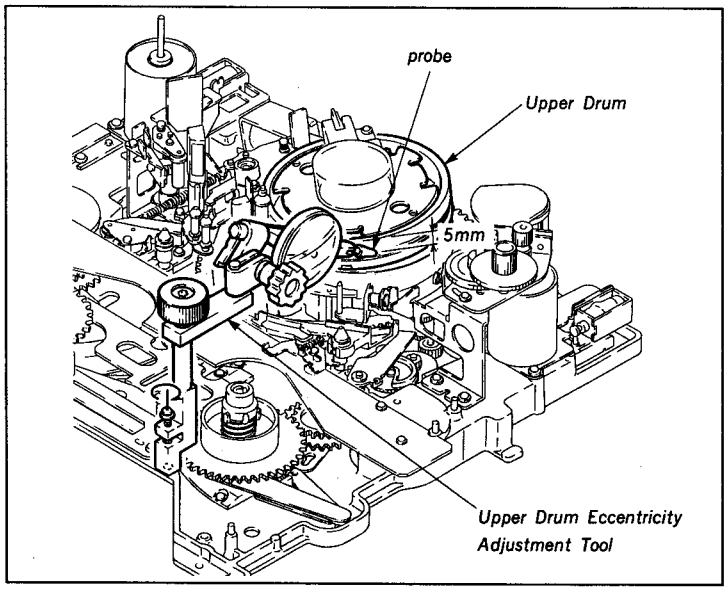
Caution 2: "Ach" (REC Ach) is the reference of all video heads. Pay careful attention to the installing position.



Installation of the Upper Drum Assembly

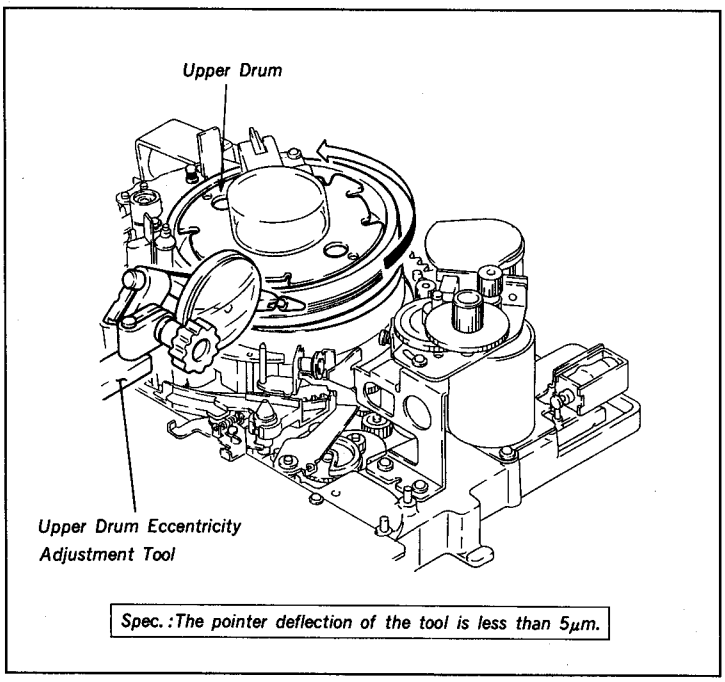
Adjustment procedure:

7. Install the Upper Drum Eccentricity Adjustment Tool.
   (1) Clean the probe with a cleaning piece moistened with cleaning fluid.
   Caution : Do not use the probe with the dust attached. This may damage the tape running surface of the Upper Drum.
   (2) Install the tool so that the probe positions at the point about 5 mm apart from the upper edge of the Upper Drum.
   Caution : Take care that the probe does not touch the video head.



Installation of the Tool

8. Perform the Upper Drum Eccentricity Adjustment.
   (1) Rotate the Upper Drum slowly counterclockwise.
   Check that the deflection of a pointer meets the specification during one complete rotation.
   If the specification is met, perform step (3) and subsequent steps.
   If not, perform step (2), then step (3) and subsequent steps.
   (2) When the above specification is not met :
   ① Tap the upper edge of the Upper Drum slightly with the handle of a screwdriver wound in cloth.
   ② Check that the specification is met again.
   (3) Tighten two screws alternately and gradually in turn. (Tightening torque : 6 kg. cm)
   (4) Check that the eccentricity of the Upper Drum meets the specification.



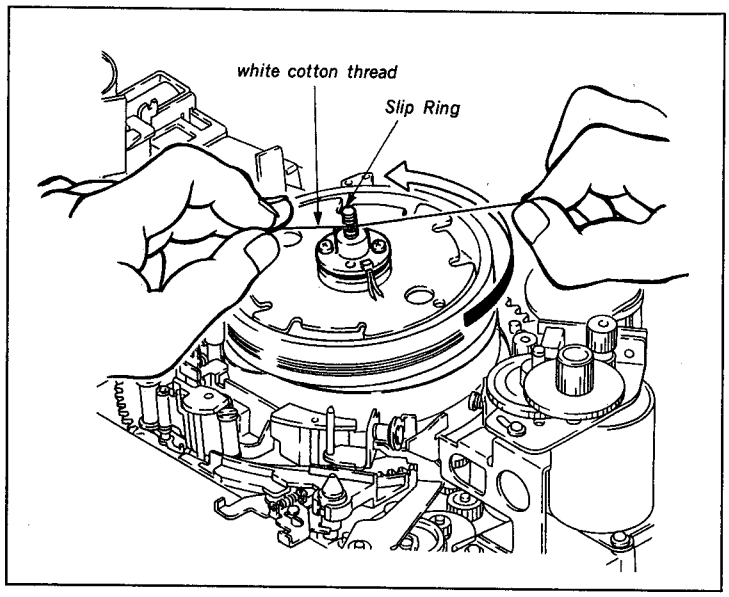
Upper Drum Eccentricity Adjustment

9. Remove the Upper Drum Eccentricity Adjustment Tools.
   Caution : Take care that the probe does not touch the video head.

10. Install the Slip Ring Assembly.
    (Refer to Sec. 3-4.)

11. Clean the Slip Ring.
    (1) Press the white cotton thread against the groove of the Slip Ring.
    (2) Rotate the Upper Drum slowly counterclockwise.

12. Install the Brush Assembly.
    (Refer to Sec. 3-3.)



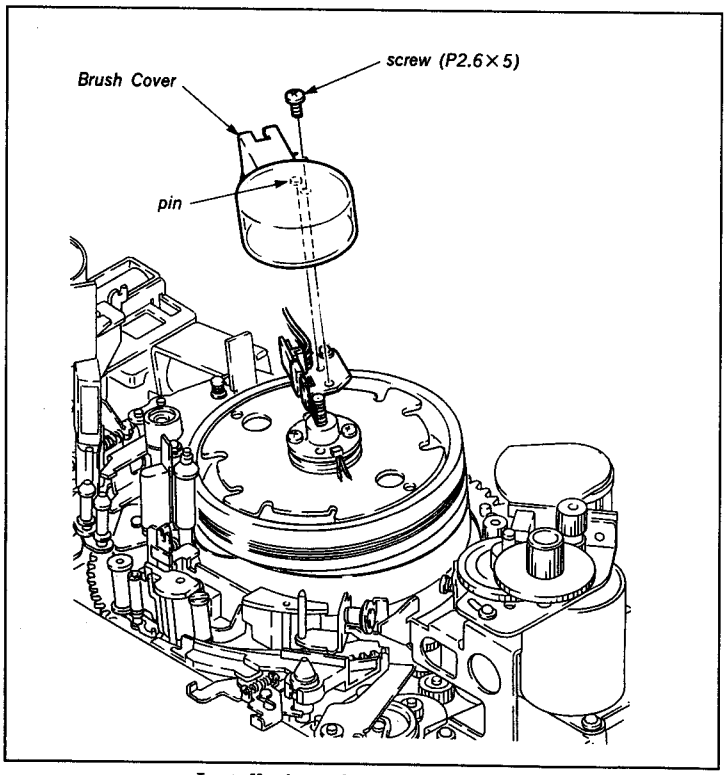
Cleaning of the Slip Ring

13. Install the Brush Cover.
    (1) Put the pin on the back of the Brush Cover into the hole of the Brush Base.
    (2) Tighten the screw (P2.6 x 5).

14. Clean the video heads and the tape running surface of the Upper Drum with a cleaning piece moistened with cleaning fluid.

15. Perform the Tape Run Alignment.
    (1) Tracking Adjustment (Refer to Sec.4-6.)
    (2) CTL Head Position Adjustment (Refer to Sec. 4-8.)
    (3) TC Head Position Adjustment (Refer to Sec. 4-11.)
    (4) Switching Position Adjustment (Refer to Sec. 4-12.)

16. Perform the Video System Adjustment.
    (Refer to Sec. 8.)

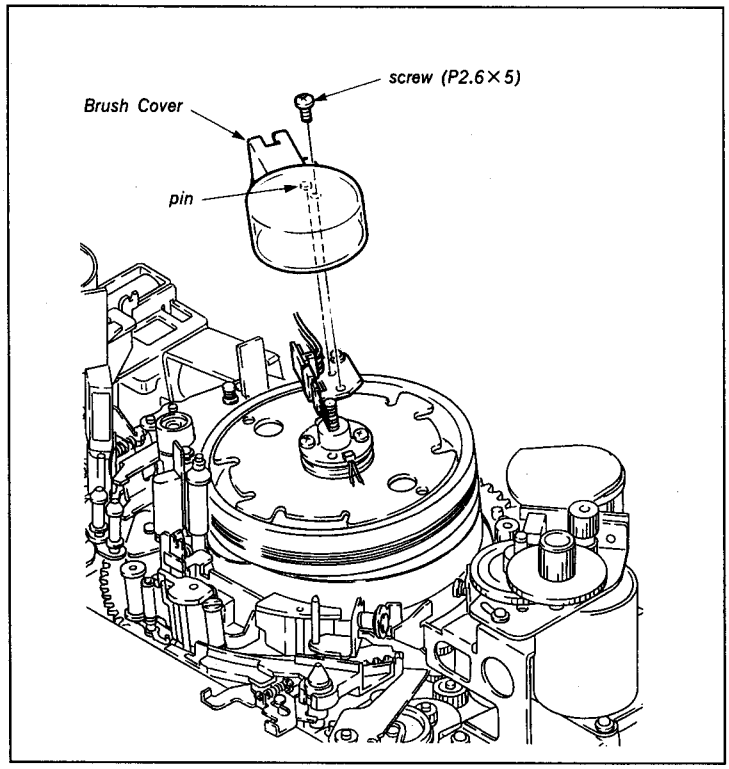


Installation of the Brush Cover

3-3. REPLACEMENT OF BRUSH ASSEMBLY

Removing procedure:

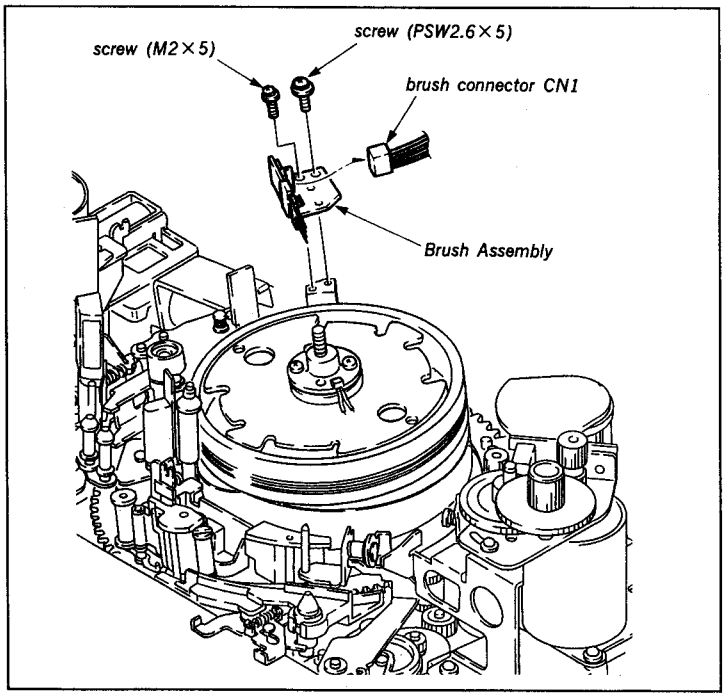
1. Loosen a screw (P2.6 x 5) shown in the figure, and remove a Brush Cover.



Removal of the Brush Cover

2. Disconnect a brush connector CN1.

3. Remove the screws (PSW2.6 x 5) and (M2 x 5) fixing the Brush Assembly, then remove the Brush Assembly.



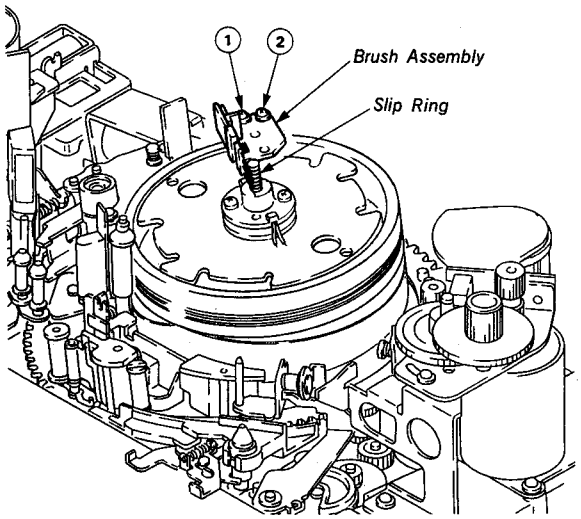
Removal of the Brush Assembly

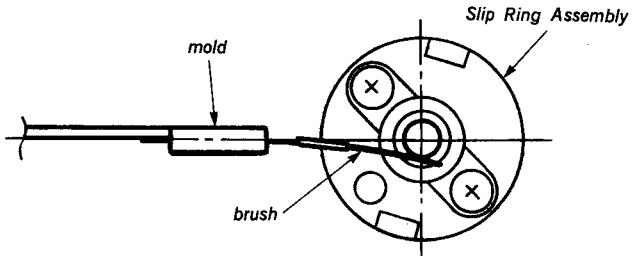
Installing procedure :

4. Clean the upper surface of a Brush Support and the mounting surface of a new Brush Base with a cleaning piece moistened with cleaning fluid.

5. Install a new Brush Assembly.
   (1) While aligning the Brushes with the grooves of a Slip Ring, thread the screws (PSW2.6 x 5) and (M2 x 5) snugly but do not tighten.
   (2) Adjust the position of the Brush Assembly so that the bending of the Brush meets the specification and tighten the screws in the order shown in the figure.
   (3) Check that the specification is met again.
   (4) Check that the Brushes are parallel to the grooves of the Slip Ring. (Fig.2)
   If not, loosen two screws shown in the figure and adjust the height of the Brush.

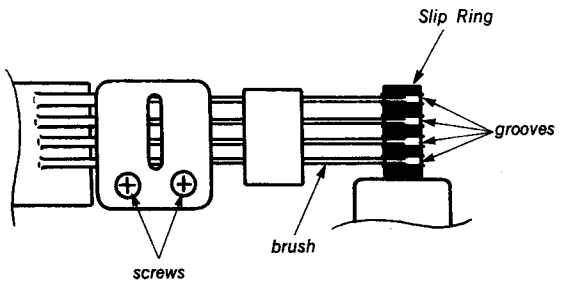
6. Connect the brush connector CN1.





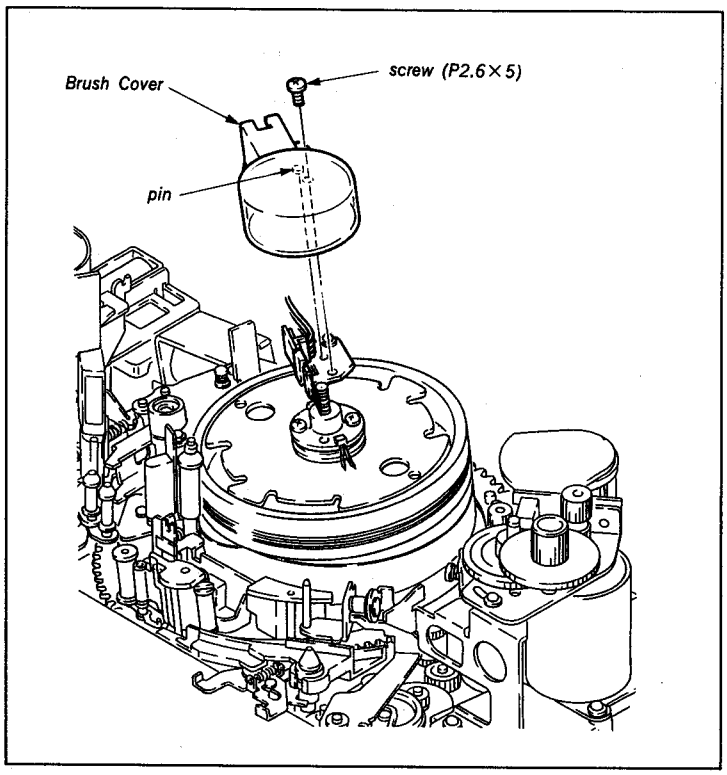
Spec. : The center line of the mold align with the center of the Slip Ring, as view from above.

〈Fig. 2〉



Installation of the Brush Assembly

7. Install the Brush Cover.
   (1) Put the pin on the back of the Brush Cover into the hole of the Brush Base.
   (2) Tighten the screw (P2.6 x 5).

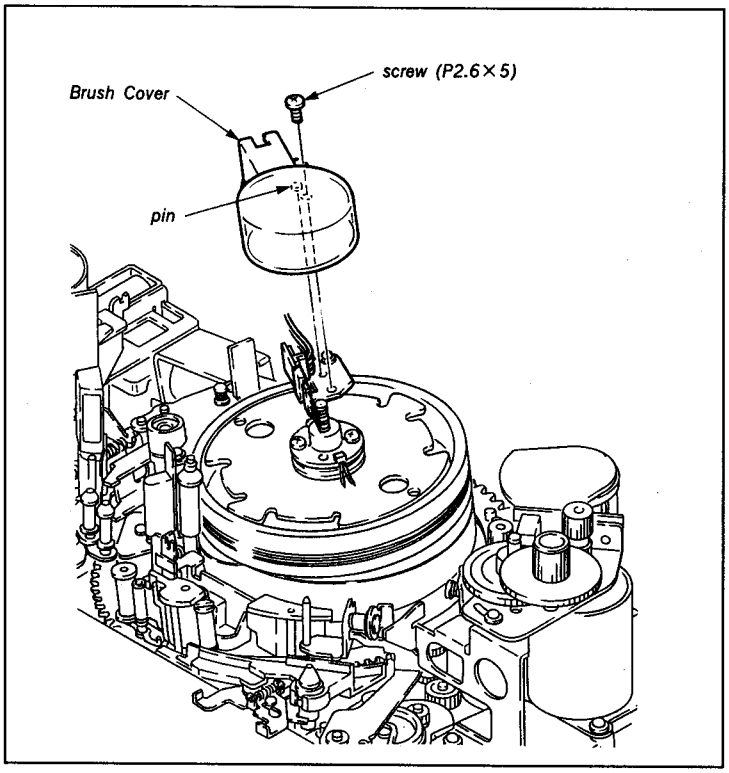


Installation of the Brush Cover

3-4. REPLACEMENT OF SLIP RING ASSEMBLY

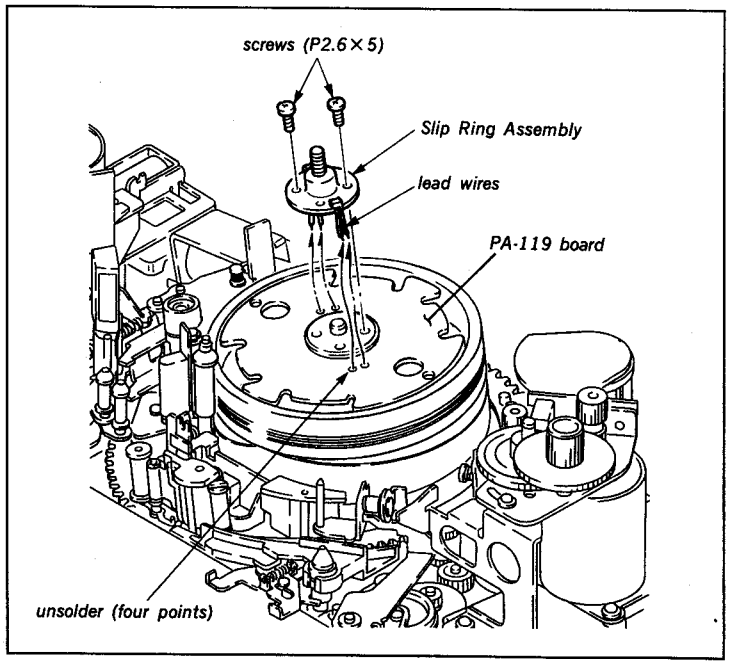
Removing procedure:

1. Loosen a screw (P2.6 x 5) shown in the figure, and remove a Brush Cover.
2. Disconnect a brush connector CN1.
3. Remove a Brush Assembly.
   (Refer to Sec. 3-3.)



Removal of the Brush Cover

4. Remove a Slip Ring Assembly.
   (1) Unsolder four lead wires solded on PA-119 board.
   (2) Remove two screws (PS2.6 x 5) shown in the figure.



Removal of the Slip Ring

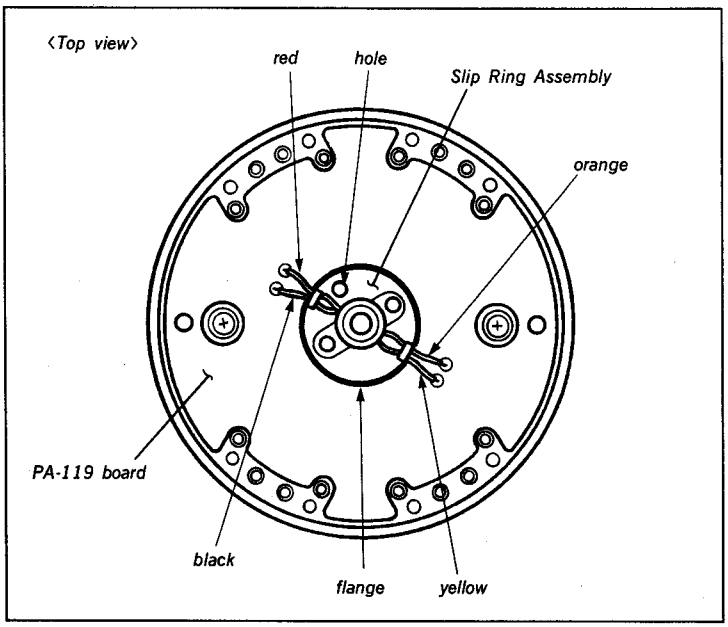
Installing procedure :

5. Clean the Slip Ring Assembly mounting surface of a flange and the mounting surface of a new Slip Ring Assembly with a cleaning piece moistened with cleaning fluid.

6. Install the new Slip Ring Assembly.
   (1) Align the Slip Ring Assembly with the hole position of the flange and secure it with two screws (PS2.6 x 5).
   (2) Wire four lead wires as shown in the figure and solder them on PA-119 board.

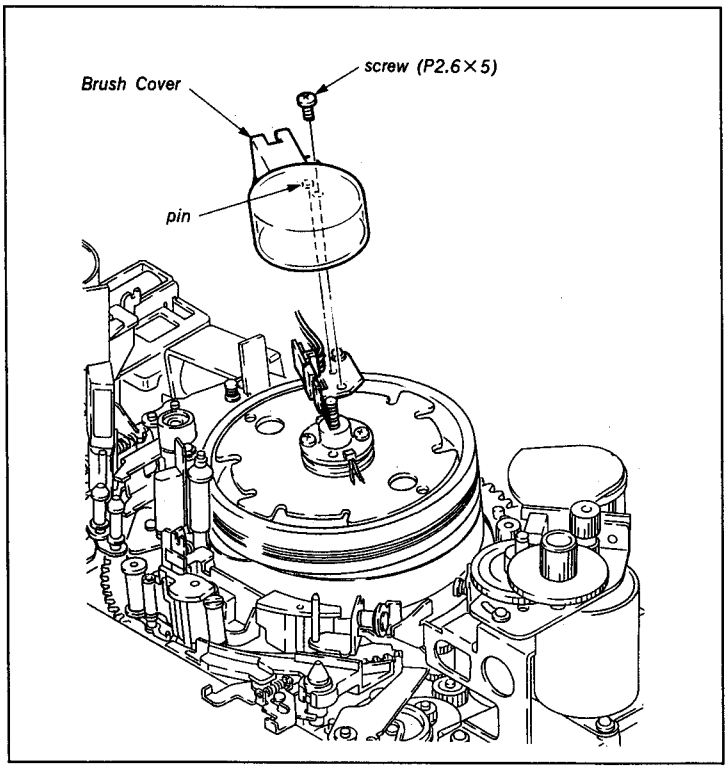
7. Install the Brush Assembly.
   (Refer to Sec. 3-3.)

8. Connect the brush connector CN1.



Installation of the Slip Ring

9. Install the Brush Cover.
   (1) Put the pin on the back of the Brush Cover into the hole of the Brush Base.
   (2) Tighten the screw (P2.6 x 5).

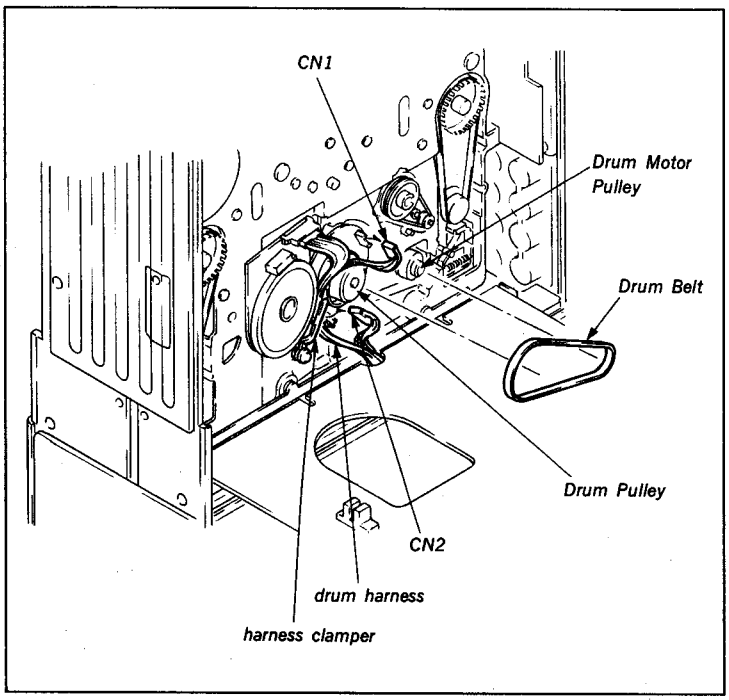


Installation of the Brush Cover

3-5. REPLACEMENT OF DRUM ASSEMBLY

Removing procedure :

1. Disconnect a brush connector CN1.
2. Place the unit with a Rear Panel Block side down.
3. Remove a Drum Belt from a Drum Pulley and Drum Motor Pulley.
4. Remove a drum harness from a harness clamper.
5. Disconnect two connectors (CN1 and CN2) connected to the Drum Assembly.

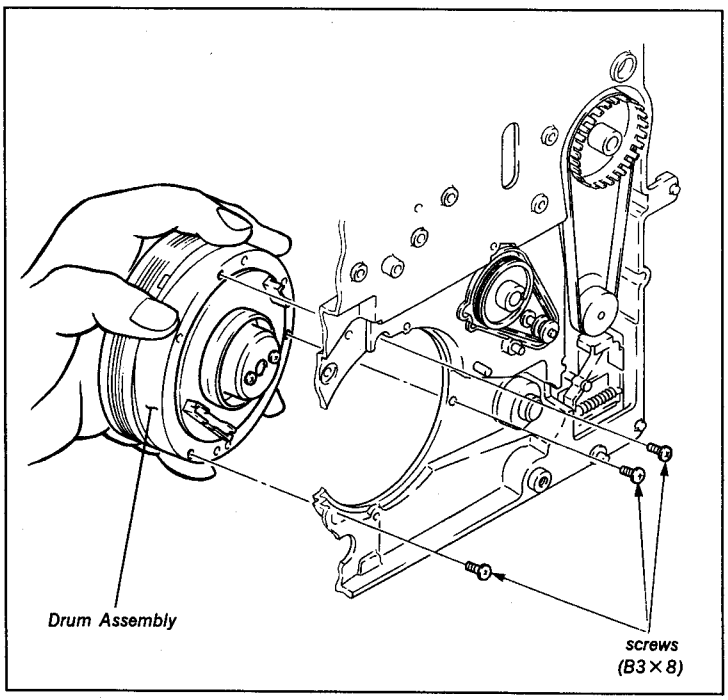


Removal of the Drum Belt and Connector

6. Remove three screws (B3 x 8) fixing the Drum Assembly, then remove the Drum Assembly.

   Caution 1 : Hold the Drum Assembly by hand to prevent it from falling.

   Caution 2 : Be careful not to damage the tape guides around the Drum Assembly.



Removal of the Drum Assembly

Installing procedure :

7. Clean the mounting surfaces of a new Drum Assembly and the drum mounting surface of a mechanical chassis with a cleaning piece moistened with cleaning fluid.

8. Install the new Drum Assembly.
   (1) Align the holes shown in the figure of the Drum Assembly with two positioning pins of a mechanical chassis and thread three screws (B3 x 8) snugly but do not tighten.
   Caution : Be careful not to damage the tape running surface of the Upper Drum, the video heads, and the tape running and lead surfaces of the Lower Drum. Moreover, take care not to damage the tape guides around the Drum Assembly.
   (2) While turning the Drum Assembly in the direction indicated by the arrow as far as it will go and pushing it toward the Entrance Guide, then tighten three screws. (Tightening torque : 8 kg.cm)
   (3) Check that there is no play between the Drum Assembly and the mechanical chassis.

9. Connect two connectors CN1 and CN2 to the Drum Assembly.

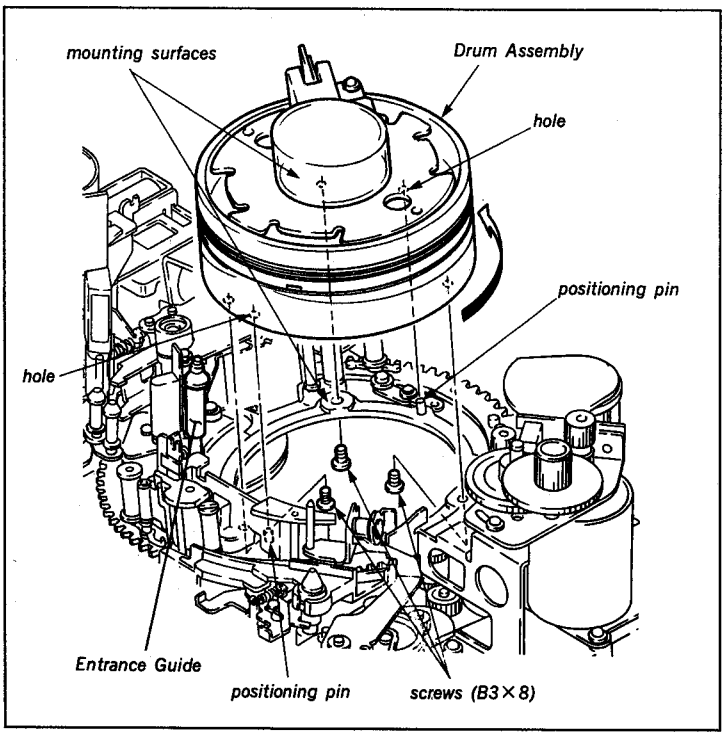
10. Fasten the drum harness with the harness clamper so that it does not touch the Drum Pulley.

11. Install the Drum Belt.
    (Refer to Sec. 3-6.)

12. Replace the unit to the horizontal position.

13. Connect the connector CN1 to the Brush Assembly.

14. Clean the tape running surface of the Drum Assembly.
    (Refer to Sec. 2-4-4.)



Installation of the Drum Assembly

Adjustment procedure:

15. Perform the Tape Run Alignment.
    (1) Tracking Adjustment (Refer to Sec. 4-6.)
    (2) CTL Head Position Adjustment (Refer to Sec. 4-8.)
    (3) TC Head Position Adjustment (Refer to Sec. 4-11.)
    (4) Switching Position Adjustment (Refer to Sec. 4-12.)

16. Perform the Video System Adjustment. (Refer to Sec. 8.)

3-6. REPLACEMENT OF DRUM BELT

Removing procedure :

1. Place the unit with a Rear Panel Block side down.

2. Remove a Drum Belt from a Drum Pulley and Drum Motor Pulley.

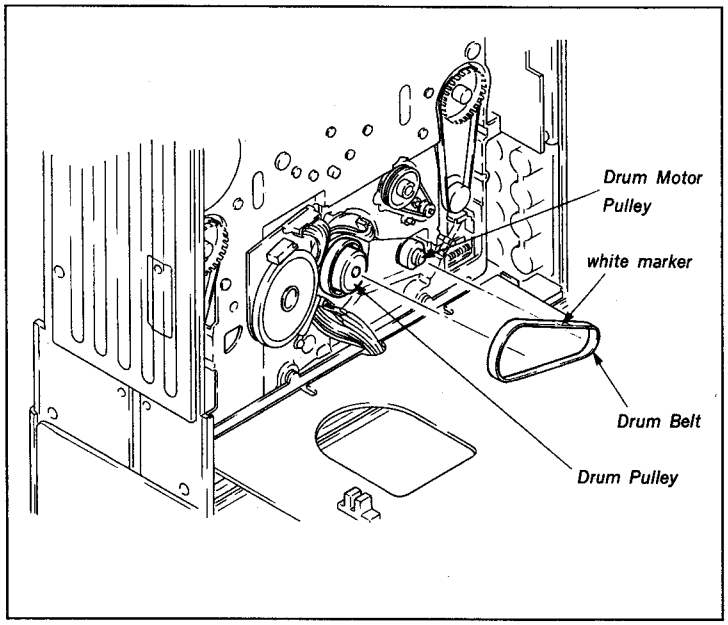
Installing procedure :

3. Clean the following portions with a cleaning cloth moistened with cleaning fluid:
   (1) Drum Pulley
   (2) Drum Motor Pulley
   (3) New Drum Belt

4. Hook the Drum Belt to the Drum Motor Pulley with its white marker outside.

5. While rotating the Drum Pulley clockwise by hand, hook the Drum Belt to the Drum Pulley.

6. Rotate the Drum Pulley clockwise by hand two or three turns and check that the Drum Belt is put in the center of the Drum Pulley and Drum Motor Pulley.



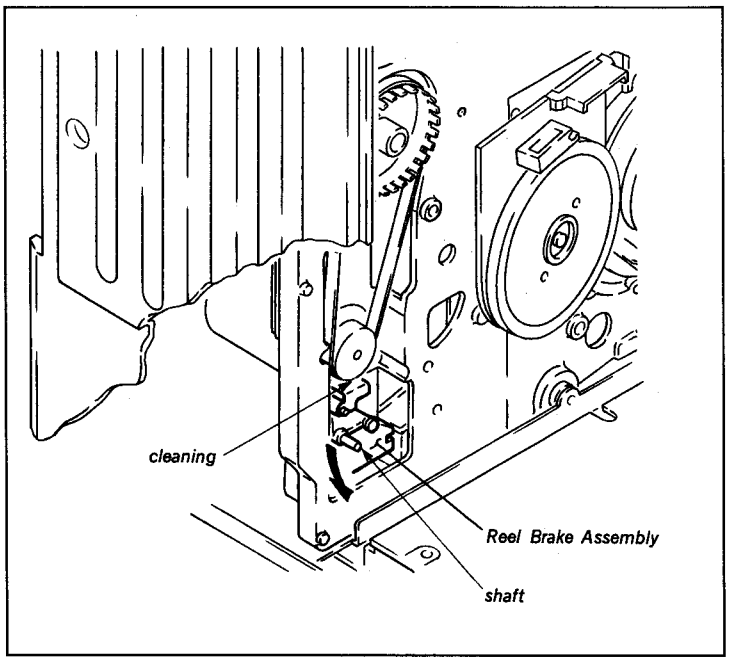
Removal/Installation of the Drum Belt

3-7. REPLACEMENT OF REEL BELT

- The replacement procedure of the Reel Belt is the same on the supply and take-up sides.

Removing procedure :

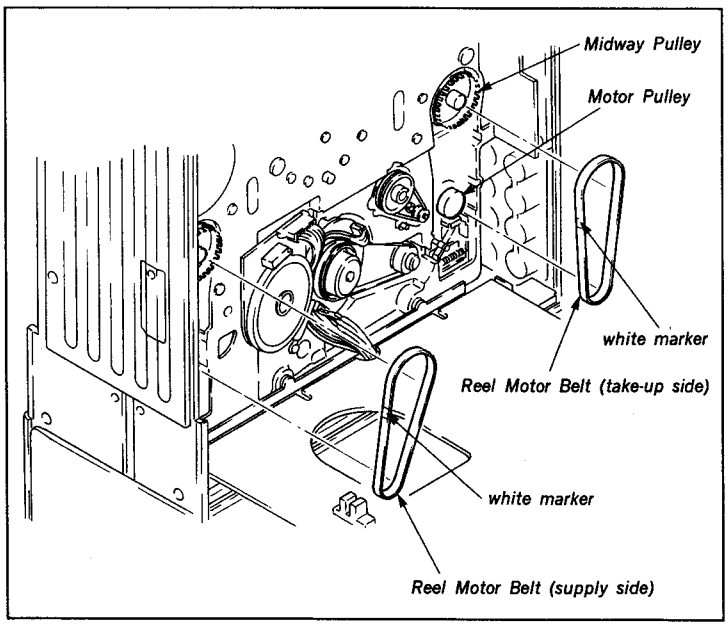
1. Place the unit with a Rear Panel Block side down.
2. Push the shaft shown in the figure of the Reel Brake Assembly in the direction indicated by the arrow, release the reel brake.
3. Remove a Reel Belt from a Motor Pulley and Midway Pulley.



Release of the Reel Brake

Installing procedure :

4. Clean the following portions with a cleaning cloth moistened with cleaning fluid.
   (1) Motor Pulley
   (2) Midway Pulley
   (3) New Reel Belt
   (4) Surface of a Brake Arm Assembly which touches the Reel Belt
5. Hook the Reel Belt to the Midway Pulley with its white marker outside.
6. While releasing the reel brake and rotating the Motor Pulley by hand, hook the Reel Belt to the Motor Pulley.
7. While releasing the reel brake and rotate the Midway Pulley by hand two or three turns, check that the Reel Belt is put in the center of the Motor Pulley and Midway Pulley.



Removal/Installation of the Reel Belt

3-8. REPLACEMENT OF THREADING BELT

Removing procedure :

1. Place the unit with a Rear Panel Block side down.

2. Remove a Threading Belt from a Motor Pulley and Deceleration Pulley.

Installing procedure :

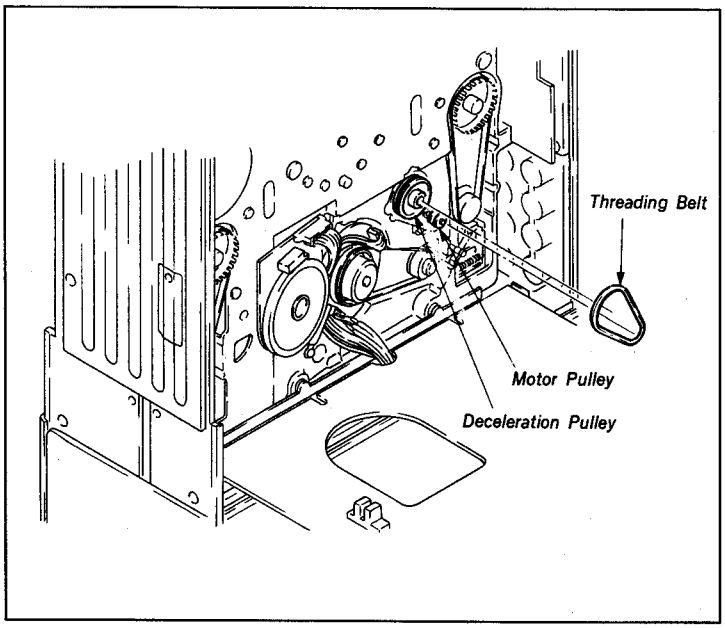
3. Clean the following portions with a cleaning cloth moistened with cleaning fluid.
   (1) Motor Pulley
   (2) Groove of Deceleration Pulley
   (3) New Threading Belt

4. Hook the Threading Belt to the groove of the Deceleration Pulley.

5. While rotating the Motor Pulley by hand, hook the Threading Belt to the groove of the Motor Pulley.

6. Check that there is no twist in the Threading Belt.

7. Check that the Threading Belt does not slip off when the Deceleration Pulley is rotated by hand two or three turns.



Removal/Installation of the Threading Belt

3-9. REPLACEMENT OF PINCH ROLLER

- Replace a Pinch Arm Assembly when a Pinch Roller is worn or damaged.

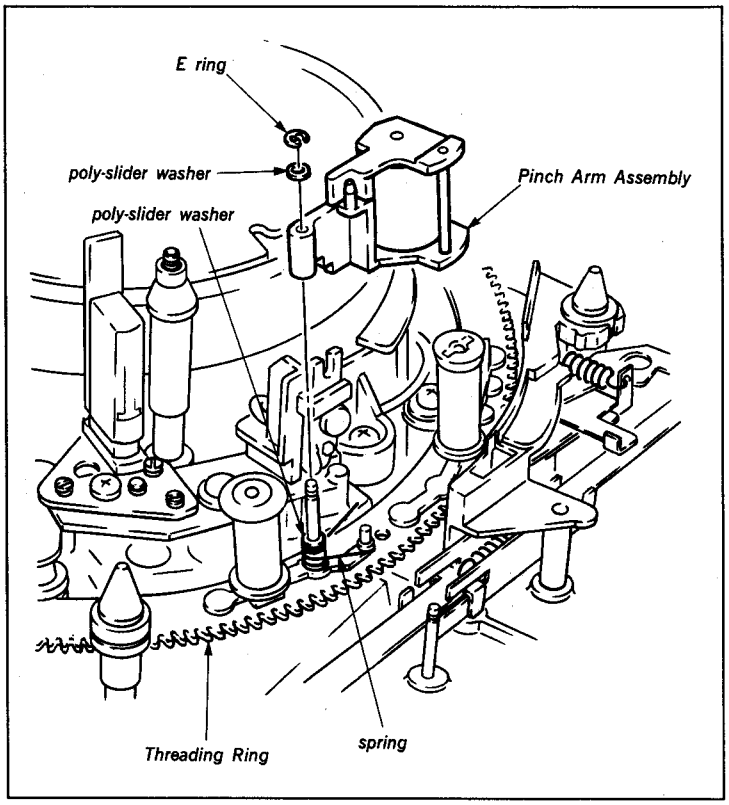
Fixture :
Thickness gauge

Removing procedure :

1. Put the unit into the unthreading end mode. (Refer to Sec.3-1.)

2. Remove the E ring and poly-slider washer from the upper portion of the Pinch Arm.

3. Remove the Pinch Arm Assembly from the Threading Ring.
   Note : Never remove the poly-slider washer and spring at the lower of the Pinch Arm.

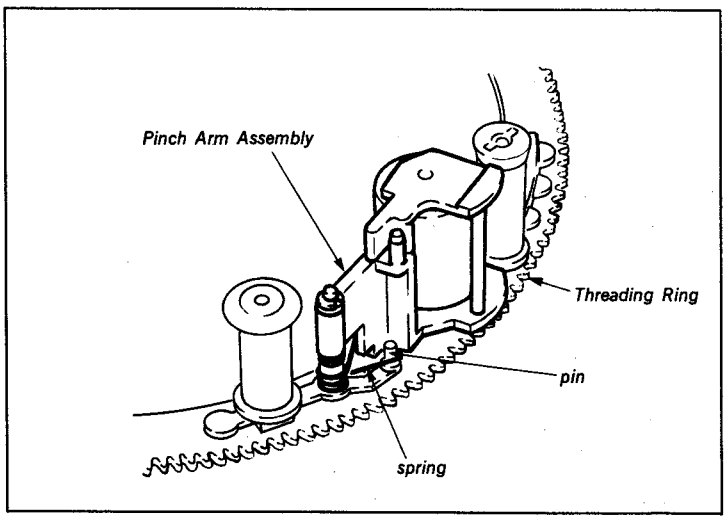


Removal of the Pinch Arm Assembly

Installing procedure:

4. Install a new Pinch Arm Assembly while putting the spring as shown in the figure.
   Note : Install the spring so that the long lead of the spring is positioned to the white pin side of the Threading Ring and the short lead is positioned to the opposite side of the Pinch Arm.

5. Insert the poly-slider washer at the upper portion of the Pinch Arm and secure it with the E ring.

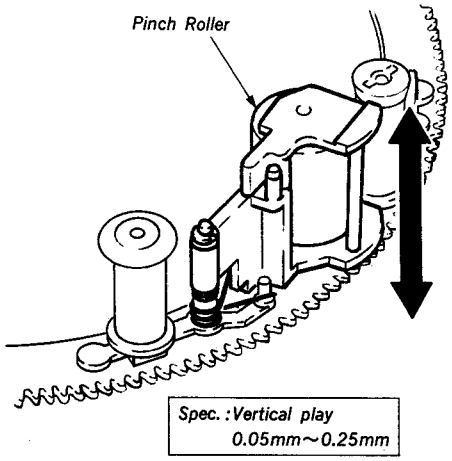


Installation of the Pinch Arm Assembly

Adjustment procedure:

6. Perform the vertical play adjustment of the Pinch Roller.
   (1) Hold the Pinch Roller Assembly by hand and move it in the vertical direction.
   Check that the vertical play meets the required specification.
   If the specification is met, perform step 7 and subsequent steps.
   If not, perform step (2), then step 7 and subsequent steps.
   (2) When the above specification is not met:
   ① Remove the E ring and install or remove the poly-slider washer at the upper portion of the Pinch Arm so that the vertical play meets the required specification.
   ② Install the E ring and check that the specification is met again.

7. Rotate the Pinch Roller by hand two or three turns and check that it rotates smoothly.
   Caution : Be careful not to damage the surface of the Pinch Roller.



**If not to meet the specification :*

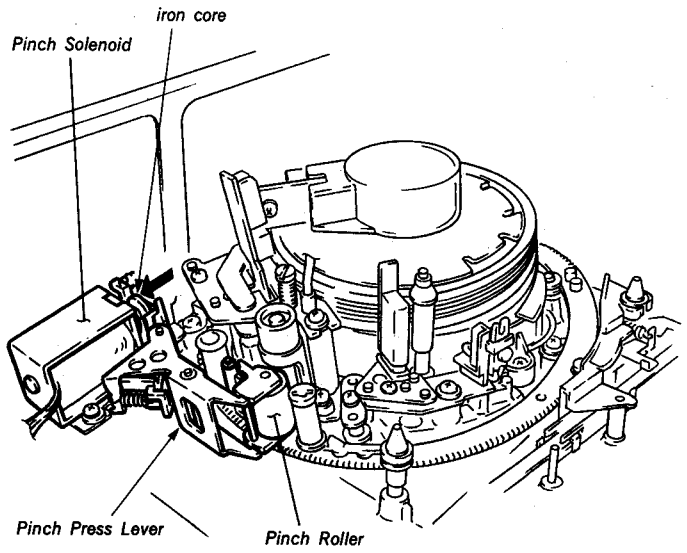
- *Adjustment poly-slider washer*

Indiameter	Thick	Part. No.
1.6	0.13	3-701-436-01
	0.25	3-701-436-11
	0.5	3-701-436-21

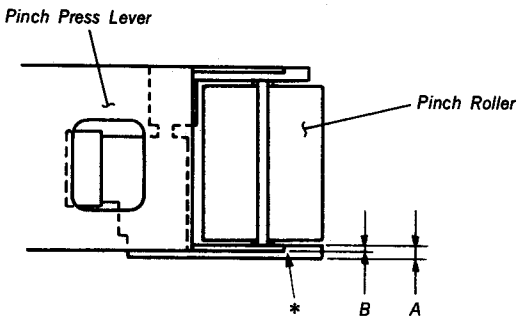
Unit : mm

Pinch Roller Vertical Play Adjustment

8. Perform the Pinch Press Lever Height Adjustment.
   (1) Put the unit into the threading end mode. (Refer to Sec. 3-1.)
   (2) Push the iron core of a Pinch Solenoid slowly in the direction indicated by the arrow.
   Check that the top and bottom plates of the Pinch Press Lever press the ∗-marked portion of the Pinch Roller. (Spec. 1).
   Check that the positional relationship between the Pinch Press Lever and the ∗-marked portion of the Pinch Roller meets the required Spec. 2.
   If Specs. 1 and 2 are met, perform step 9 and subsequent steps.
   If not, perform step (3), then step 9 and subsequent steps.
   (3) When the above specifications are not met :
      ① Put the unit into the unthreading end mode. (Refer to Sec. 3-1.)
      ② Adjust the poly-slider washer at the lower portion of the Pinch Arm so that the Specs.1 and 2 are met.
      ③ Perform the vertical play adjustment of the Pinch Roller again.



〈Side view〉



Spec. 1 :The top and bottom plates of the Pinch Press Lever press the ∗-marked portion of the Pinch Roller.
Spec. 2 :B≧0.7A

∗If not to meet the specifications :

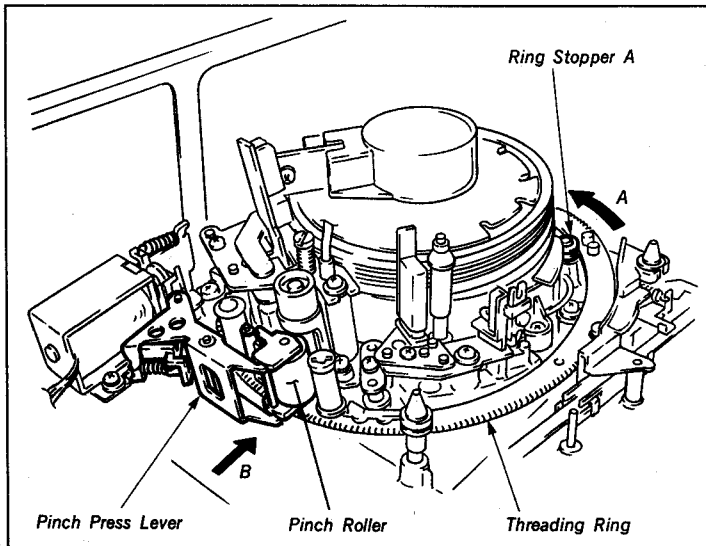
- *Adjustment poly-slider washer*

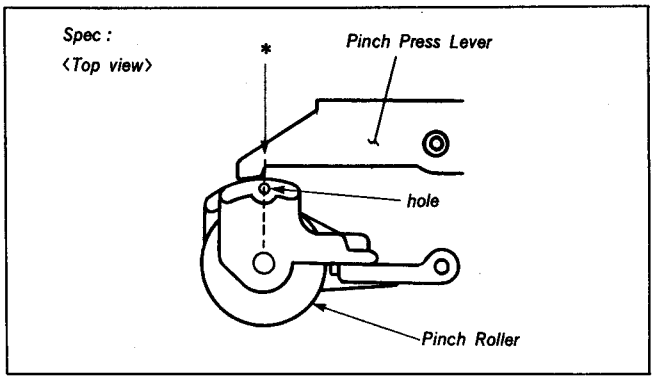
Indiameter	Thick	Part. No.
1.6	0.13	3-701-436-01
	0.25	3-701-436-11
	0.5	3-701-436-21

Unit : mm

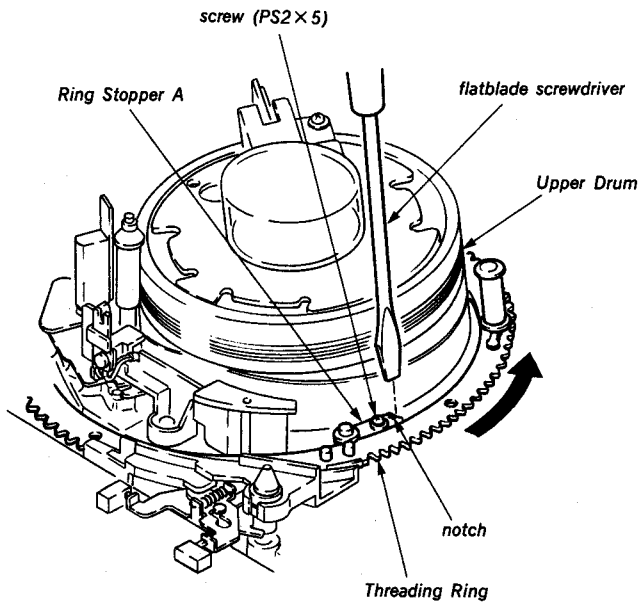
Pinch Press Lever Height Adjustment

9. Perform the Threading End Position Adjustment.
   (1) Put the unit into the threading end mode. (Refer to Sec. 3-1.)
   (2) While pushing the Threading Ring in the direction indicated by the arrow A by hand, push the Pinch Press Lever in the direction indicated by the arrow B. At this time, check that the hole of the Pinch Roller and the ✱-marked portion of the Pinch Press Lever are positioned as shown in the figure (Specification).
   If the specification is met, perform step 11 and subsequent steps.
   If not, perform step (3), then step 10 and subsequent steps.
   (3) When the above specification is not met :
      ① Loosen a fixing screw (PS2 x 5) of Ring Stopper A about 1/2 to one turn.
      ② While pushing the Threading Ring in the direction indicated by the arrow by hand, insert a flatblade screwdriver into the notch of a Ring Stopper A and adjust the position of the Ring Stopper A so that it meets the required specification.
      Caution : Be careful not to damage the tape running surface of the Upper Drum, the video head, and the tape running and lead surfaces of the Lower Drum when inserting the flatblade screwdriver.
      ③ Repeat the unthreading and threading two or three times and check that the required specification is met.





✱ *If not to meet the specification :*



Threading End Position Adjustment

10. Perform the Stopper Lever B Position Adjustment.

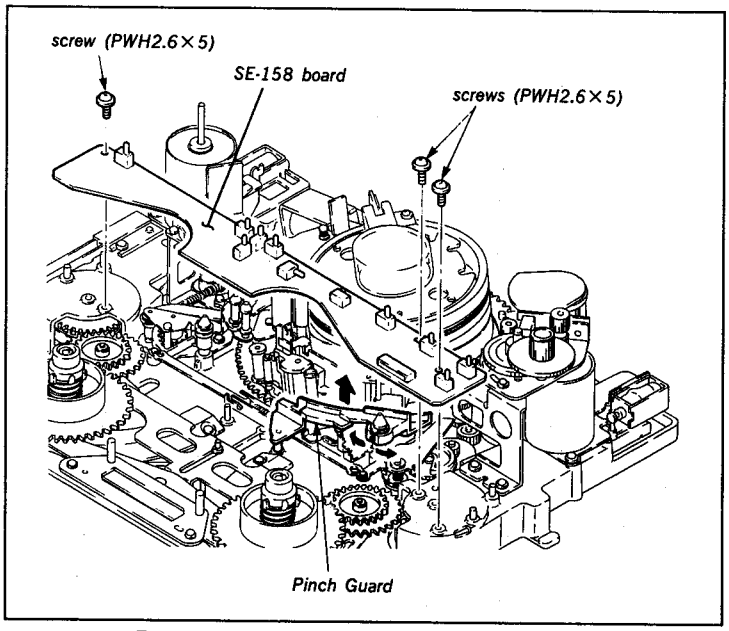
Note: Perform this check or adjustment only when the position of the Ring Stopper A is adjusted in step 9.

(1) Put the unit into the threading end mode. (Refer to Sec. 3-1.)

(2) Remove three screws (PWH2.6 x 5), then remove SE-158 board.

(3) Pull out a Pinch Guard.

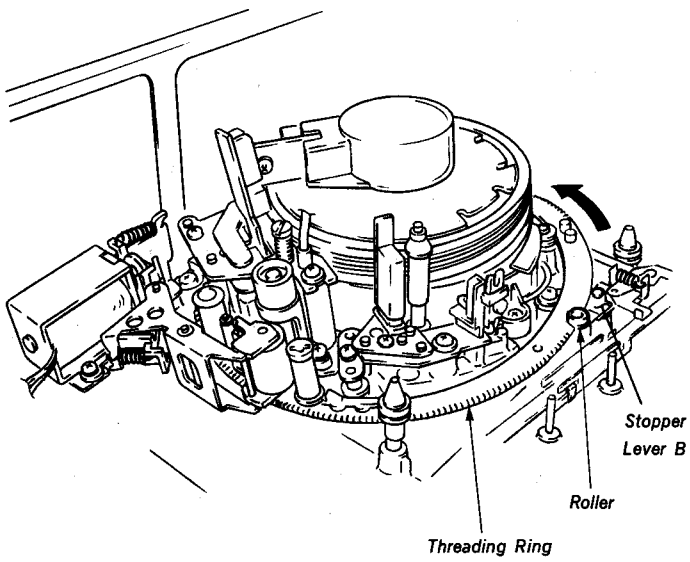
—Continued on the next page—

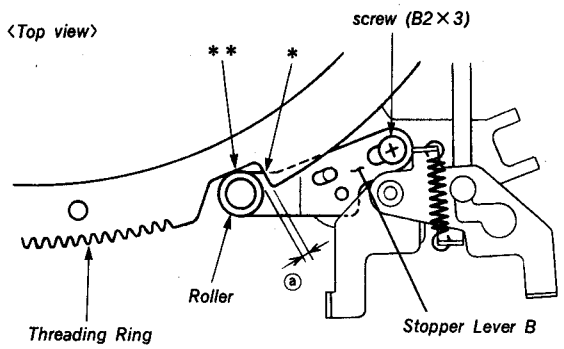


Removal of SE-158 Board and Pinch Guard

(4) While pushing the Threading Ring in the direction indicated by the arrow by hand, check that the clearance between the * -marked portion of the Threading Ring and the Roller of a Stopper Lever B meets the required Spec.1.
Check that the Roller of the Stopper Lever B contacts with the * *-marked portion of the Threading Ring (Spec. 2).
If Specs. 1 and 2 are met, perform step (6) and subsequent steps.
If not, perform step (5), then step (6) and subsequent steps.

—Continued on the next page—

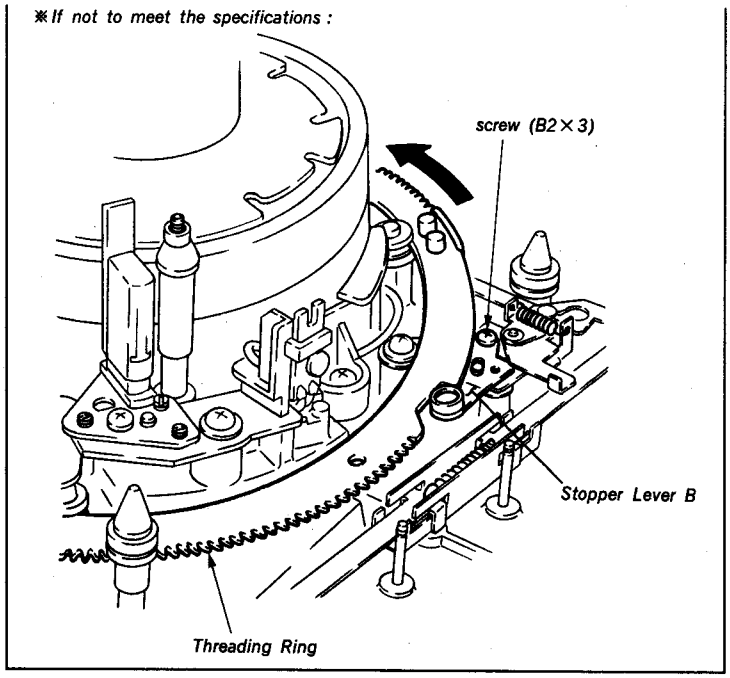




Spec. 1 :0.05≦ⓐ≦0.15mm
*Spec. 2 :The Roller of the Stopper Lever B contacts with * *-marked portion of the Threading Ring.*

(5) When the above specifications are not met :
   ① Loosen a fixing screw (B2 x 3) of the Stopper Lever B about 1/2 to one turn.
   ② While pushing the Threading Ring in the direction indicated by the arrow by hand, adjust the position of the Stopper Lever B so that it meets required Specs. 1 and 2.
   ③ Repeat the unthreading and threading two or three times and check that Specs. 1 and 2 are met.

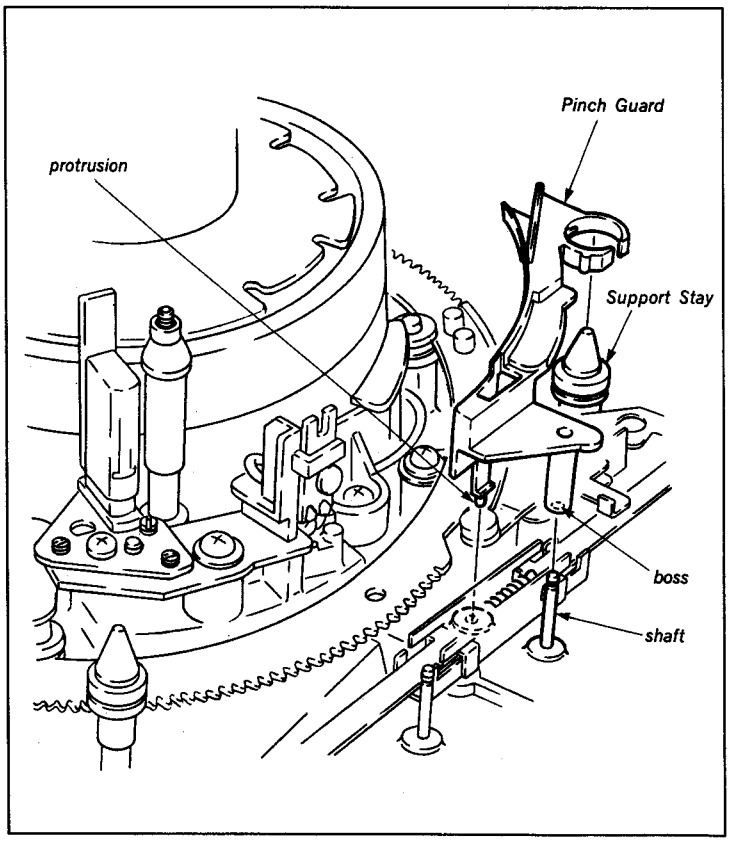
(6) Put the unit into the threading end mode. (Refer to Sec. 3-1.)



Stopper Lever B Position Adjustment

(7) Fit the boss and protrusion of the Pinch Guard with the shaft and hole of a mechanical chassis and push the Pinch Guard into a Support Stay until it is locked.

(8) Fix SE-158 board with three screws (PWH2.6 x 5).

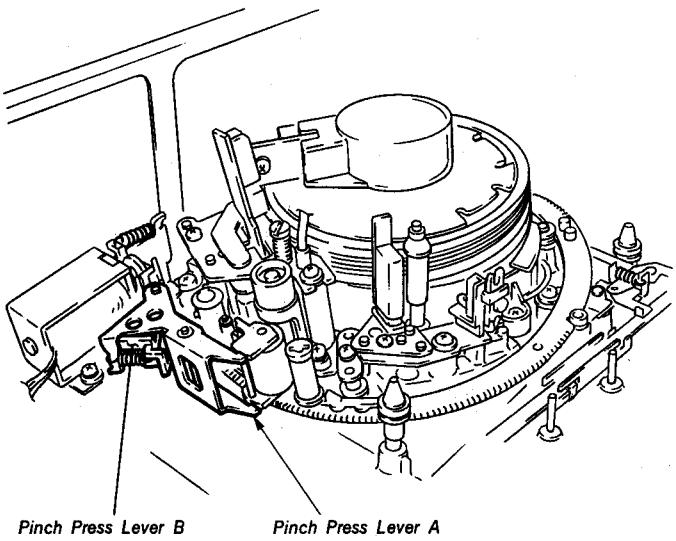


Installation of the Pinch Guard

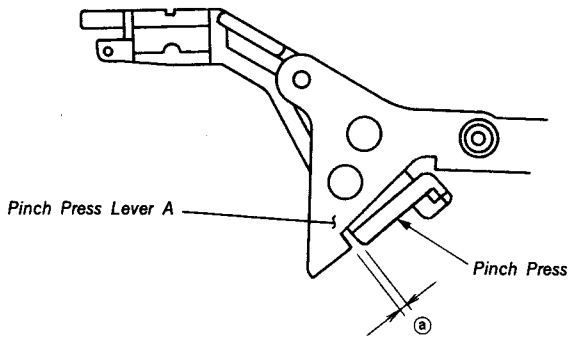
11. Perform the Pinch Press Lever Position Adjustment.
    (1) Turn the power on.
    (2) Press the PLAY button without a cassette tape.
    (3) Check that the clearance between the Pinch Press Levers A and B meet the required specification.
    If the specification is met, perform step (5) and subsequent steps.
    If not, perform step (4), then step (5) and subsequent steps.
    (4) When the above specification is not met :
        ① Insert a flatblade screwdriver into the notch of a Pinch Solenoid Base and adjust the position of the Pinch Solenoid so that the clearance meets the required specification.
        When the specification is met, tighten the screw 1 while keeping the flatblade screwdriver inserted into the notch.
        ② Pull out the flatblade screwdriver from the notch and tighten the screw 2.
        ③ Check that the clearance meets the required specification again.
    (5) Repeat the unthreading and threading two or three times and check that the specification is met.
    (6) Turn the power off.

12. Clean the surface of the Pinch Roller with a cleaning cloth moistened with cleaning fluid.

13. Perform the Tape Run Adjustment.
    (Refer to Sec. 4-2.)



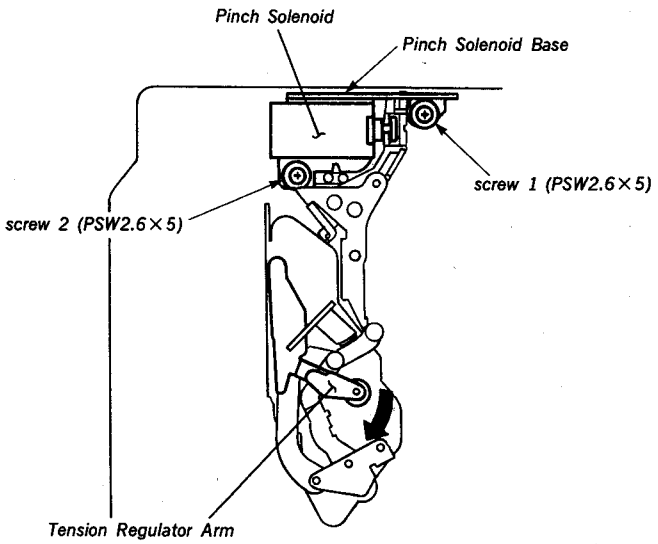
〈Top view〉



Spec : 0.2mm≦ⓐ≦0.4mm

※If not to meet the specification :

〈Top view〉



Pinch Press Lever Position Adjustment

SECTION 5
POWER SUPPLY AND SYSTEM CONTROL ALIGNMENT

[Equipment Required]

- DC digital voltmeter
- NTSC test signal generator (TEKTRONIX TSG-170A or equivalent)
- Frequency counter
- Blank tape (BCT-20M)

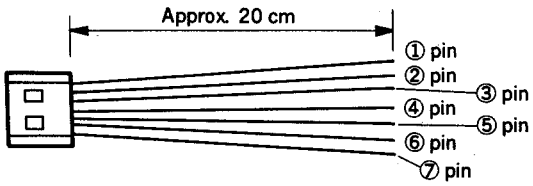
5-1. POWER SUPPLY CHECK

Be sure to perform the following checks after repairing or replacing DC-DC converter/PSW-12.

5-1-1. DC-DC Converter Voltage Check

Prepare the following cable for measurement.

HOUSING, 7P P/N 1-569-200-11 (1 pc.)
CONTACT, FEMALE P/N 1-569-194-11 (7 pcs.)



Preparations for adjustment	Specifications	Adjustments
• Insert the prepared cable for measurement into CN971/MB-335 (on the A side facing the drum). • EXT DC IN; 12.0 $^{+5.0}_{-2.0}$ Vdc • VIDEO IN; Color Bars • CAMERA/LINE SW; LINE • MODE SW; PB/EE • POWER SW; ON • Insert a BCT-20M blank tape. • REC mode • After the check/adjustment, remove the cable for measurement. DC digital voltmeter	CN971-① pin/MB-335 GND CN971-② pin/MB-335 +9.0±0.2Vdc CN971-③ pin/MB-335 +5.0±0.2Vdc CN971-④ pin/MB-335 +5.0±0.2Vdc CN971-⑤ pin/MB-335 −5.0±0.2Vdc CN971-⑥ pin/MB-335 −9.0±0.2Vdc CN971-⑦ pin/MB-335 EXT DC IN±0.1Vdc CN965-① pin/MB-335 +48.0±4.0Vdc	(Check) If the specification is not satisfied, adjust the following variable resistors. +9.0 Vdc: ◐ RV101/PSW-12 (C-1) +5.0 Vdc: ◐ RV102/PSW-12 (B-1) −5.0 Vdc: ◐ RV103/PSW-12 (B-1) −9.0 Vdc: ◐ RV104/PSW-12 (B-1) +48.0 Vdc: ◐ RV105/PSW-12 (D-1)

5-1-2. DC-DC Converter Frequency Check

This check should be performed only when beat noise is noticeable due to the DC-DC converter frequencies.

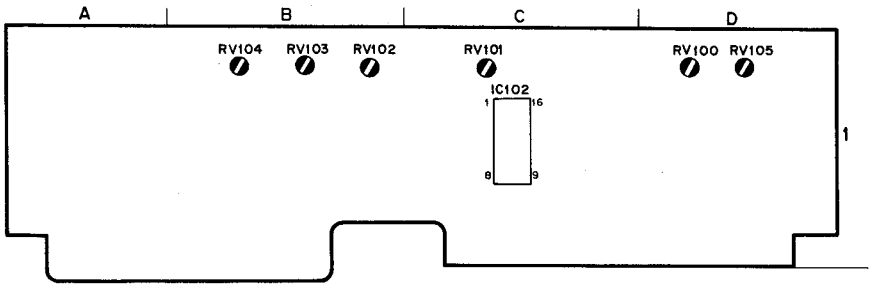
Preparations for adjustment	Specifications	Adjustment
• EXT DC IN; 12.0 $^{+5.0}_{-2.0}$ Vdc • MODE SW; PB/EE • POWER SW; ON • EE Mode Frequency counter	IC102-① pin/PSW-12 (C-1) (GND) IC102-⑧ pin/PSW-12 (C-1) There should be no beats due to a difference between the converter frequency of IC103 and IC104 (Oscillation frequencies are approximately 100 kHz).	(Check) If the specification is not satisfied, adjust the following variable resistor. ◐ RV100/PSW-12 (D-1)

5-2. SYSTEM CONTROL ALIGNMENT

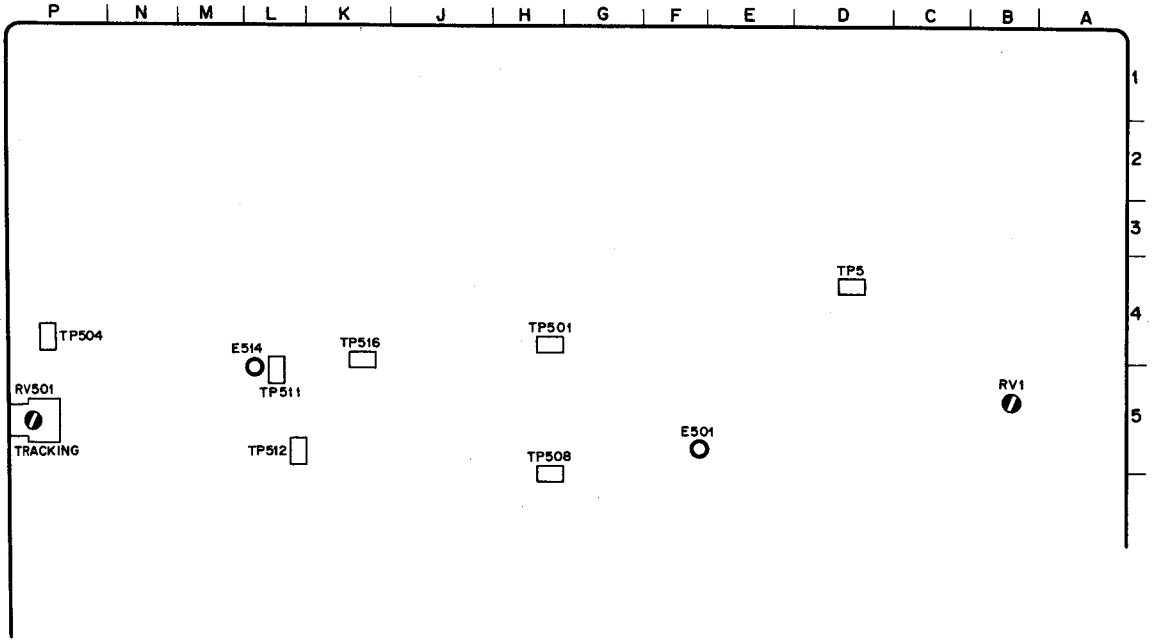
5-2-1. Reference Voltage Adjustment

Preparations for adjustment	Specifications	Adjustment
• EXT DC IN; 12.0 $^{+5.0}_{-2.0}$ Vdc • POWER SW; OFF	TP5/SST-1 (D-4A) (GND) E501/SST-1 (F-5A) +5.00±0.01 Vdc	◐ RV1/SST-1 (B-5A)

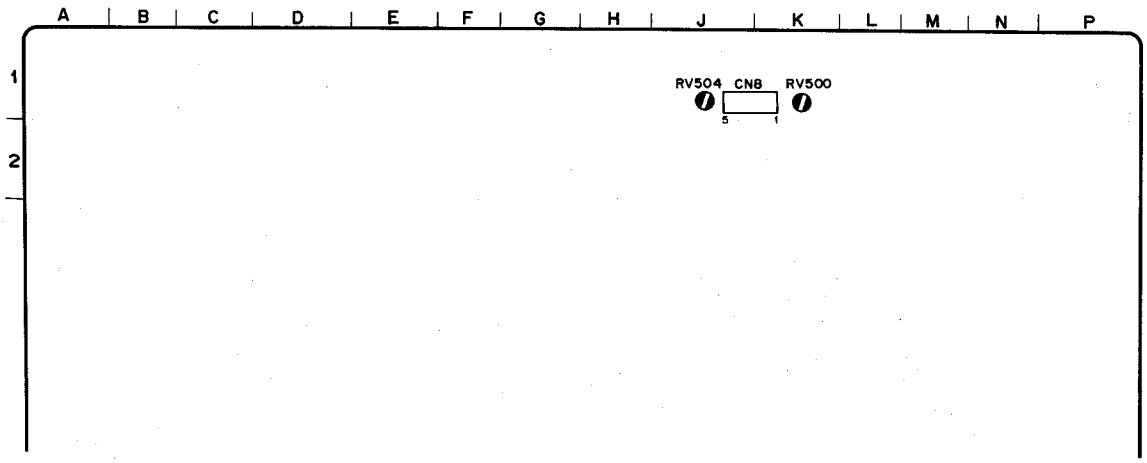
Locations of RVs and IC on PSW-12 board. (B SIDE)



Locations of TPs, Es and RVs on SST-1 board. (A SIDE)



Locations of CN and RVs on SST-1 board. (B SIDE)



SECTION 7
AUDIO SYSTEM ALIGNMENT

[Equipment Required]

- Audio oscillator
- AC/DC voltmeter
- Audio noise meter/Audio level meter
- Spectrum analyzer
- Dual-trace oscilloscope
- Blank tape BCT-20G (oxide), BCT-20M (metal)
- Alignment tape CR8-1A (8-960-097-45)

Contents

TIME min. sec	AUDIO TRACK	VIDEO TRACK	CTL TRACK
0 : 00	1kHz, 0VU*1	—	CTL
2 : 55	Blank		
3 : 00	10kHz, −10VU	—	CTL
4 : 55	Blank		
5 : 00	1kHz, −20VU	—	CTL
5 : 55	Blank		
6 : 00	40Hz, −20VU*2	—	CTL
6 : 25	Blank		
6 : 30	7kHz, −20VU*2	—	CTL
6 : 55	Blank		
7 : 00	10kHz, −20VU*2	—	CTL
7 : 25	Blank		
7 : 30	15kHz, −20VU*2	—	CTL
7 : 55	Blank		
8 : 00	1kHz, 0VU	—	1kHz, 0VU
10 : 00			

• Alignment tape CR5-1B (8-960-096-41)

Contents

TIME min. sec	VIDEO TRACK	AFM
0 : 00	RF Sweep	No-Signal
2 : 00	60% H Sweep (CTDM)	
5 : 00	Pulse & Bar (CTDM)	
8 : 00	Multi Burst	
11 : 00	Pulse & Bar	
14 : 00	75% Color Bars	400 Hz SINE WAVE 25 kHz DEVIATION
16 : 30		75 kHz DEVIATION
17 : 00	50% Bowtie & 12.5T	No-Signal
19 : 00	Line 17 Signal	
22 : 00	Quad Phase	
24 : 00	Flat Field	
26 : 00	75% Color Bar with Dropout	
28 : 00	Composite V Sweep with VISC	
30 : 00		

Notes:

* 1. When this tape is reproduced in the audio reference level check or adjustment, the output level (0 dB) should be corrected according to the correction value as follows.
  Example: Correction value = −0.5dB
  Output level = 0dB − 0.5dB = −0.5dB
* 2. When this tape is reproduced in the audio frequency response check or adjustment, the output level should be corrected according to the correction value.

[Switch Setting]

Front Panel
- CH-1 AUDIO SELECT switch .....MANUAL
- CH-2 AUDIO SELECT switch .....MANUAL
- LIGHT switch .....OFF

Connector Panel
- CAMERA/LINE SELECT switch....LINE (CH-1 to CH-4)
- AUDIO IN LEVEL SELECT switch..+4dB (CH-1 to CH-4)
- AFM INPUT switch CH-3/CH-4
- MODE switch .....PB
- CH-4 OUT switch CH-4
- +48V switch .....OFF (CH-1 to CH-4)
- DOLBY NR switch.....OFF
- MONITOR switch .....OFF (CH-1 to CH-4)
- CONFI switch .....Y AUDIO
- VIDEO IN SELECT switch .....LINE
- DUB switch.....CH-2
- SUPERIMPOSE switch.....OFF

AU-142 Board
- S201.....CH-1
- S202.....CP SW

VR-118 Board
- S302.....ON

These switches and controls should not be changed in position unless otherwise specified.

[Information for Adjustment]

Blank Tape

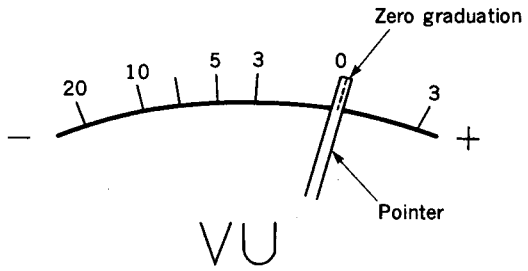
The "Blank Tape" described in the alignment procedures indicates a cassette tape on which no video/audio signals are recorded.

When performing the audio system alignment, on the AU-142 Board, remove the battery case on the rear panel side, then adjust the variable resistor RVxxx and the filter FLxxx from the rear panel side and adjust the LVxxx and Txxx from the front panel side.

The address of an adjustment part such as RVxxx on a board is represented by its identification alphabetic characters and number. Note that only adjustment parts provided on the A side have the character A after their numbers.

Examples: LV901/AU-142(A-4A) .....AU-142 board, address A-4 on the A side
RV901/AU-142(E-4) .....AU-142 board, address E-4 on the B side

7-1. LEVEL METER CALIBRATION ADJUSTMENT

Preparations for adjustment	Specifications	Adjustments
Step 1. • AUDIO IN; 1kHz, +4dBs (CH-1 to CH-4) • MODE SW; PB/EE • EE mode Audio oscillator Audio level meter	CH-1 to CH-4 AUDIO OUT (at 600-ohm load) +4.0±0.1dBm	CH-1 : ◐CH-1 REC VR on the front panel CH-2: ◐CH-2 REC VR on the front panel CH-3 : ◐CH-3 REC VR on the front panel CH-4 : ◐CH-4 REC VR on the front panel
Step 2. • Put the unit upright and place the meter in horizontal plane. • Others; The same as for Step 1.	Audio level meter (CH-1 to CH-4)  The pointer should indicate zero. 〈Reference〉 Position balance When the unit is put horizontally and the meter vertically, the deviation of the pointer is to be within three pointer widths.	CH-1 : ◐RV202/KY-207 (E-3) CH-2 : ◐RV203/KY-207 (F-3) CH-3 : ◐RV204/KY-207 (G-3) CH-4 : ◐RV205/KY-207 (G-3)

7-2. REC REFERENCE LEVEL SETTING

Preparations for adjustment	Specifications	Adjustments
• CH-1/CH-2 AUDIO IN; 1kHz, +4dBs • MODE SW; PB/EE • EE mode Audio oscillator Audio level meter	CH-1; TP201/AU-142 (F-3) CH-2; TP202/AU-142 (E-3) −10.0±0.1dBs	CH-1 : CH-1 REC VR on the front panel =RV301/VR-118 (B-1A) CH-2 : CH-2 REC VR on the front panel =RV302/VR-118 (C-1A) Caution: Once adjusted, the REC variable resistors should not be touched unless otherwise specified.

7-3. AFM REC REFERENCE LEVEL SETTING (1)

Preparations for adjustment	Specifications	Adjustments
• CH-3/CH-4 AUDIO IN ; 400Hz, +4dBs • MODE SW ; PB/EE • EE mode Audio oscillator Audio level meter	Step 1. CH-3 ; TP601/AU-142 (E-2) CH-4 ; TP651/AU-142 (E-2) +19.8±0.2dBs	CH-3 : CH-3 REC VR on the front panel =RV303/VR-118 (D-1A) CH-4 : CH-4 REC VR on the front panel =RV304/VR-118 (E-1A) Caution : Once adjusted, the REC variable resistors should not be touched unless otherwise specified.
	Step 2. CH-3/CH-4 AUDIO OUT (at 600-ohm load) +4.0±0.1dBm	CH-3 : ◐RV605/AU-142 (D-1) CH-4 : ◐RV655/AU-142 (D-2)

7-4. MONITOR OUTPUT LEVEL ADJUSTMENT

Preparations for adjustment	Specifications	Adjustments
Step 1. • CH-1 AUDIO IN ; 1 kHz, +4dBs • MONITOR CH-1 SW ; ON • Connect a 8-ohm stereo ear or head phone to the appropriate jack. • EE mode Audio oscillator Audio level meter	HEAD PHONE OUT(X)/CN409-① pin/CP-164 (G)/CN409-③ pin/CP-164 −26.0±0.2dBs	◐ PHONE LEVEL VR on the connector panel =RV1/CC-47
Step 2. • CH-1 AUDIO IN ; No signals • MONITOR CH-1 SW ; OFF • Connect a 8-ohm stereo ear or head phone into the appropriate jack. • Insert a BCT-20G cassette tape and have wind finished. • PLAY mode Audio level meter	HEAD PHONE OUT(X)/CN409-① pin/CP-164 (G)/CN409-③ pin/CP-164 −36.0±0.5dBs	◐RV551/AU-142 (F-4A) (ALARM TONE LEVEL)

7-5. LIMITER OPERATION LEVEL ADJUSTMENT

Preparations for adjustment	Specifications	Adjustment
• CH-1/CH-2 AUDIO IN; 1 kHz, −30dBs • CH-1/CH-2 AUDIO IN level SW; −60dB • S302/VR-118 (B-2A); ON • After the adjustment, set the following switches and control as given below: CH-1 AUDIO IN level SW; +4dB CH-2 AUDIO IN level SW; +4dB Audio oscillator Audio level meter	CH-1/CH-2 AUDIO OUT (at 600-ohm load) +12.0±0.2dBm	CH-1, CH-2: ◐ RV201/KY-207 (J-3)

7-6. PB FREQUENCY RESPONSE ADJUSTMENT

Step 1. PB Frequency Response Check

Preparations for adjustment	Specifications	Adjustments
• Play back 1kHz, 7kHz, 10kHz and 15kHz signal portion on the alignment tape CR8-1A. Audio level meter	CH-1/CH-2 AUDIO OUT (at 600-ohm load) Frequency / Specification 1kHz / Reference 7kHz / Ref±0.3dB 10kHz / Ref±0.5dB 15kHz / Ref±0.5dB Caution: The individual audio levels should be corrected according to the correction value. (Refer to Paragraph 7-1, Note 1.) • If the specification is not satisfied, perform Step 2.	• 7kHz adjustment CH-1 : ◐ RV402/AU-142 (E-4) CH-2 : ◐ RV452/AU-142 (E-4) • 10kHz, 15kHz adjustment CH-1 : ◐ RV404/AU-142 (D-4) CH-2 : ◐ RV454/AU-142 (D-4)

Step 2. In case the high-frequency level is lower than the specified value:

Preparations for adjustment	Specifications	Adjustments
• Play back 1kHz, 7kHz, 10kHz and 15kHz signal portion on the alignment tape CR8-1A.	1. Solder-bridge slots SL401 and SL451 and perform Step 1. 2. If the specification is not satisfied: Solder-bridge slots SL402 and SL452 and perform Step 1. 3. If the specification is not yet satisfied: Solder-bridge slots SL403 and SL453 and perform Step 1.	CH-1 : SL401-403/AU-142 (D-4) CH-2 : SL451-453/AU-142 (D-4)

7-7. PB LEVEL ADJUSTMENT

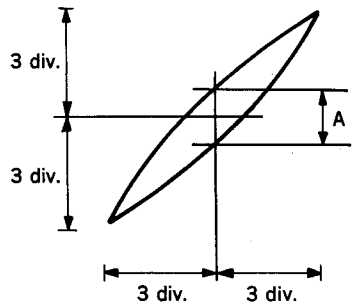
Step 1.

Preparations for adjustment	Specifications	Adjustments
• Play back 1kHz, 0VU signal portion on the alignment tape CR8-1A.	CH-1 ; TP201/AU-142 (E-3) CH-2 ; TP202/AU-142 (E-3) −10.0±0.2dBs	CH-1 : ◐RV403/AU-142 (E-4) CH-2 : ◐RV453/AU-142 (E-4)

Step 2.

Preparations for adjustment	Specifications	Adjustments
• Play back 1kHz, 0VU signal portion on the alignment tape CR8-1A.	CH-1/CH-2 AUDIO OUT (at 600-ohm load) +4.0±0.2dBm	CH-1 : CH-1 PB VR on the front panel =RV305/VR-118 (C-2A) CH-2 : CH-2 PB VR on the front panel =RV306/VR-118 (C-2A) Caution : Once adjusted, the PB variable resistors should not be touched.

7-8. PB CHANNEL-TO-CHANNEL PHASE DIFFERENCE ADJUSTMENT

Preparations for adjustment	Specifications	Adjustment
Step 1. • Play back 10kHz, −10VU signal portion on the alignment tape CR8-1A. Oscilloscope; Mode ..... X-Y	CH-1/CH-2 AUDIO OUT (at 600-ohm load) A≦5° (0.5 div.)  	◐RV407/AU-142 (D-3)
Step 2. • DOLBY NR SW ; ON • Others ; The same as for Step 1. • After the check, return DOLBY NR switch to OFF.	The same as for Step 1.	(Check)

7-9. FULL ERASE CURRENT ADJUSTMENT

Preparations for adjustment	Specifications	Adjustment
• Insert a blank tape BCT-20M. • REC mode AC voltmeter	TP1/FE-11 (1) 310±10mV rms (2) There should be no significant waveform distortion from sine wave.	◐ RV907/AU-142 (A-4)
 Frequency counter	TP1/FE-11 40±3kHz	(Check)

7-10. DUB ERASE CURRENT ADJUSTMENT

7-10-1. CH-1 DUB Erase Current Adjustment

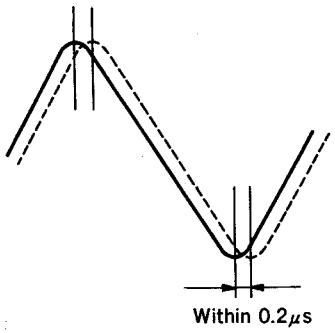
Preparations for adjustment	Specifications	Adjustments
• CH-1/CH-2 AUDIO IN; No signal • Insert a CTL signal recorded cassette tape (metal). • Pseudo REC mode *	Step 1. TP901/AU-142 (A-4) 65±1kHz	(Check)
	Step 2. TP901/AU-142 (A-4) Maximize the level.	◐ LV901/AU-142 (A-4A) (on the front panel side)
   AC voltmeter Frequency counter	Step 3. TP901/AU-142 (A-4) 330±10mV rms	◐ RV905/AU-142 (B-3)

7-10-2. CH-2 DUB Erase Current Adjustment

Preparations for adjustment	Specifications	Adjustments
• CH-1/CH-2 AUDIO IN; No signal • Insert a CTL signal recorded cassette tape (metal). • Pseudo REC mode*	Step 1. TP902/AU-142 (A-4) Maximize the level.	◐ LV902/AU-142 (A-4A) (on the front panel side)
   AC voltmeter	Step 2. TP902/AU-142 (A-4) 330±10mV rms	◐ RV906/AU-142 (A-4)

* Pseudo REC mode: This indicates a state in which a short is provided between TP501/AU-142 (A-3) and IC503-① pin/AU-142 (B-3). After the adjustment, remove the short.

7-10-3. CH-1 and CH-2 DUB Erase Current Phase Adjustment

Preparations for adjustment	Specifications	Adjustments
• CH-1/CH-2 AUDIO IN; No signal • Insert a CTL signal recorded cassette tape (metal). • Pseudo REC mode* AC voltmeter Oscilloscope TRIG IC903-⑪pin/AU-142 (A-3)	CH-1 ; TP901/AU-142 (A-4) CH-2 ; TP902/AU-142 (A-4) (1) The phases of the CH-1 and CH-2 DUB Erase current should coincide with each other within ± 0.2μs at the peaks.  (2) Level difference from previous adjustment ≦10 mV	If the specification (1) is not satisfied, with respect to Paragraph 7-10-1 (CH-1 DUB level) and Paragraph 7-10-2 (CH-2 DUB level), the phase on the channel showing a higher level should be fine adjusted. ( ) indicates the pin and adjustment on CH-2, in case the level of CH-2 is higher than that of CH-1. a) Connect an AC voltmeter to TP901/AU-142 (TP902/AU-142). b) Fine adjust so that the waveform at TP901/AU-142 (TP902/AU-142) coincide with the waveform at TP902/AU-142 (TP901/AU-142) at the peak positions using LV901/AU-142 (LV902/AU-142), and allow the specification (2) to be satisfied.

* Pseudo REC mode: As described in Paragraph 7-10-2.

7-11. REC BIAS TRAP ADJUSTMENT

Preparations for adjustment	Specifications	Adjustments
• CH-1/CH-2 AUDIO IN ; No signal • Pseudo REC mode * Audio level meter	Step 1. (CH-1) TP402/AU-142 (D-3) Maximize the level.	◐ T903/AU-142 (B-4A) ◐ T904/AU-142 (C-4A) Adjust alternately.
	Step 2. (CH-1) TP402/AU-142 (D-3) Minimize the level. ≦+10dBs	◐ LV401/AU-142 (D-3A) If the specification is not satisfied, re-adjust from Step 1.
	Step 3. (CH-2) TP452/AU-142 (D-4) Maximize the level.	◐ T905/AU-142 (B-4A) ◐ T906/AU-142 (C-4A) Adjust alternately.
	Step 4. (CH-2) TP452/AU-142 (D-4) Minimize the level. ≦+10dBs	◐ LV451/AU-142 (D-4A) If the specification is not satisfied, re-adjust from Step 3.

* Pseudo REC mode: As described in Paragraph 7-10-2.

7-12. BIAS CURRENT ADJUSTMENT (METAL)

Preparations for adjustment	Specifications	Adjustments
• CH-1/CH-2 AUDIO IN ; 1 kHz, +4dBs • Insert a blank tape BCT-20M. • REC mode	Step 1. CH-1 ; TP403/AU-142 (C-4) (GND) ; TP404/AU-142 (C-4) 15.0±0.2mV rms	◐ RV902/AU-142 (B-4) ◐ T903/AU-142 (B-4A) ◐ T904/AU-142 (C-4A) Adjust alternately.
Audio oscillator AC digital voltmeter	Step 2. CH-2 ; TP453/AU-142 (D-4) (GND) ; TP454/AU-142 (D-4) 15.0±0.2mV rms	◐ RV904/AU-142 (C-3) ◐ T905/AU-142 (C-4A) ◐ T906/AU-142 (C-4A) Adjust alternately.

7-13. DUB BIAS TRAP ADJUSTMENT

Step 1. CH-1 Adjustment

Preparations for adjustment	Specifications	Adjustment
• CH-1/CH-2 AUDIO IN ; No signal • Insert a CTL signal recorded cassette tape. • CH-2 ; DUB mode Audio level meter	CH-1 ; TP405/AU-142 (E-3) Minimize the level. (≦−20dBs)	CH-1 : ◐LV402/AU-142 (E-3A)

Step 2. CH-2 Adjustment

Preparations for adjustment	Specifications	Adjustment
• CH-1/CH-2 AUDIO IN ; No signal • Insert a CTL signal recorded cassette tape. • CH-1 ; DUB mode Audio level meter	CH-2 ; TP455/AU-142 (F-4) Minimize the level. (≦−20dBs)	CH-2 : ◐LV452/AU-142 (E-4A)

7-14. OVERALL FREQUENCY RESPONSE ADJUSTMENT (METAL)

<table>
<tr><th>Preparations for adjustment</th><th>Specifications</th><th>Adjustments</th></tr>
<tr><td>Step 1.
• CH-1/CH-2 AUDIO IN; 40Hz, 90Hz, 1kHz, 3kHz, 7kHz, 10kHz, 15kHz, −16dBs
• S201/AU-142 (E-4A); CH-1
• S202/AU-142 (E-4A); CP SW
• NR SW on the connector panel; OFF
• Insert a blank tape BCT-20M.
• REC mod
• Play back the recorded portion.

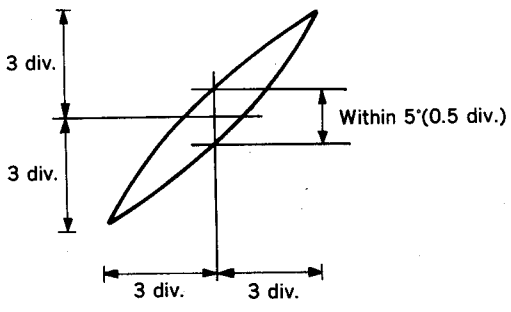
Audio oscillator
Audio level meter</td><td>CH-1/CH-2 AUDIO OUT (at 600-ohm load)

<table><tr><th>Frequency</th><th>Specification</th></tr><tr><td>40Hz</td><td>Ref±3dB</td></tr><tr><td>90Hz</td><td>Ref±2.5dB</td></tr><tr><td>1kHz</td><td>Reference</td></tr><tr><td>3kHz</td><td>Ref±0.5dB</td></tr><tr><td>7kHz</td><td>Ref±0.5dB</td></tr><tr><td>10kHz</td><td>Ref±0.5dB</td></tr><tr><td>15kHz</td><td>Ref±0.5dB</td></tr></table></td><td>(Check)</td></tr>
<tr><td>Step 2.
[If the specification is not satisfied at 10kHz - 15kHz]
• CH-1/CH-2 AUDIO IN; 10 kHz, +4dBs
• REC mode</td><td>CH-1 ; TP403/AU-142 (C-4)
(GND); TP404/AU-142 (C-4)
CH-2 ; TP453/AU-142 (D-4)
(GND); TP454/AU-142 (D-4)
• Adjust in accordance with the difference at the 10kHz signal portion between the measured level and the specification in Step 1.
In case the measured level in Step 1 is higher. → Raise the level.
In case the measured level in Step 1 is lower. → Lower the level.</td><td>CH-1 : ◐ RV305/AU-142 (B-3)
CH-2 : ◐ RV355/AU-142 (B-3)</td></tr>
<tr><td>Step 3.
[If the specification is not satisfied only at 15kHz]
• CH-1/CH-2 AUDIO IN: 15 kHz, +4dBs
• REC mode</td><td>Measuring points on CH-1/CH-2: The same as for Step 2.
• Adjust by the difference (up to 0.3dB) at the 15kHz signal portion between the measured level and the specification in Step 1. If correcting by more than 0.3dB, perform the adjustment of Step 2.
• After the adjustment, play back the recorded portion again and perform from Step 1 to check the frequency response.</td><td>CH-1 : ◐ LV301/AU-142 (C-4A)
CH-2 : ◐ LV351/AU-142 (C-4A)</td></tr>
</table>

7-15. OVERALL LEVEL ADJUSTMENT (METAL)

Preparations for adjustment	Specifications	Adjustments
• CH-1/CH-2 AUDIO IN; 1 kHz, +4dBs • Insert a blank tape BCT-20M. • REC mode • Play back the recorded portion.	Step 1. CH-1 ; TP201/AU-142 (F-3) CH-2 ; TP202/AU-142 (E-3) −10.0±0.2dBs	(Check)
	Step 2. If the specification is not satisfied, in the REC mode, measure and adjust the level at the following points corresponding to the difference between the measured value in Step 1 and the specified value. CH-1 ; TP401/AU-142 (D-3) CH-2 ; TP451/AU-142 (D-4) After the adjustment, record and play back newly recorded portion again and perform Step 1 to check the level.	CH-1 : RV303/AU-142 (D-2) CH-2 : RV353/AU-142 (D-3)
Audio oscillator Audio level meter	Step 3. CH-1/CH-2 AUDIO OUT (at 600-ohm load) +4.0±0.4dBm	(Check)

7-16. OVERALL PHASE ADJUSTMENT (METAL)

Preparations for adjustment	Specifications	Adjustment
• CH-1/CH-2 AUDIO IN; 15 kHz, +4dBs • NR SW on the connector panel; ON • Insert a blank tape BCT-20M. • REC mode • Play back the recorded portion. • After the adjustment, return DOLBY NR switch to OFF.	CH-1/CH-2 AUDIO OUT (at 600-ohm load)  	RV301//AU-142 (D-2)
Audio oscillator Oscilloscope; Mode .... X-Y	After adjusting RV301, repeat record and play back to reduce the phase difference to within ±5°.	

7-17. BIAS CURRENT ADJUSTMENT (OXIDE)

Preparations for adjustment	Specifications	Adjustments
• CH-1/CH-2 AUDIO IN ; No signal • Insert a blank tape BCT-20G. • REC mode	Step 1. CH-1 ; TP403/AU-142 (C-4) CH-2 ; TP404/AU-142 (C-4) 11.0±0.2mV rms	◐ RV901/AU-142 (B-4)
AC voltmeter	Step 2. CH-2 ; TP453/AU-142 (D-4) (GND); TP454/AU-142 (D-4) 11.0±0.2mV rms	◐ RV903/AU-142 (B-3)

7-18. OVERALL FREQUENCY RESPONSE ADJUSTMENT (OXIDE)

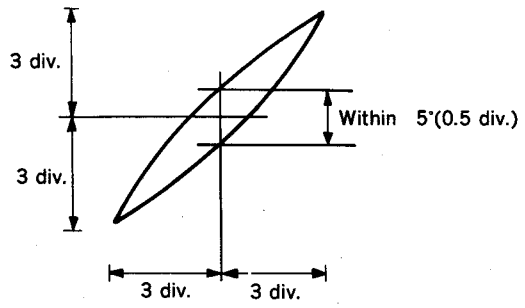
<table>
<tr><th>Preparations for adjustment</th><th>Specifications</th><th>Adjustments</th></tr>
<tr><td>Step 1.
• CH-1/CH-2 AUDIO IN; 40Hz, 90Hz, 1kHz, 3kHz, 7kHz, 10kHz, 15kHz, −16dBs
• Insert a blank tape BCT-20G.
• REC mode
• Play back the recorded portion.

Audio oscillator
Audio level meter</td><td>CH-1/CH-2 AUDIO OUT (at 600-ohm load)
<table><tr><th>Frequency</th><th>Specification</th></tr><tr><td>40Hz</td><td>Ref±3dB</td></tr><tr><td>90Hz</td><td>Ref±2.5dB</td></tr><tr><td>1kHz</td><td>Reference</td></tr><tr><td>3kHz</td><td>Ref±0.5dB</td></tr><tr><td>7kHz</td><td>Ref±0.5dB</td></tr><tr><td>10kHz</td><td>Ref±0.5dB</td></tr><tr><td>15kHz</td><td>Ref±0.5dB</td></tr></table></td><td>(Check)</td></tr>
<tr><td>Step 2.
[If the specification is not satisfied at 10kHz −15kHz]
• CH-1/CH-2 AUDIO IN; 10kHz, +4dBs
• REC mode</td><td>CH-1 ; TP403/AU-142 (C-4)
(GND); TP404/AU-142 (C-4)
CH-2 ; TP454/AU-142 (D-4)
(GND); TP454/AU-142 (D-4)
• Adjust in accordance with the level difference at the 10kHz signal portion between the measured level and the specification in Step 1.
In case the measured value in Step 1 is higher. → Raise the level.
In case the measured value in Step 1 is lower. → Lower the level.</td><td>CH-1 : RV306/AU-142 (C-3)
CH-2 : RV356/AU-142 (C-3)</td></tr>
<tr><td>Step 3.
[If the specification is not satisfied only at 15kHz]
• CH-1/CH-2 AUDIO IN; 15kHz, +4dBs
• REC mode</td><td>Measuring points on CH-1/CH-2: The same as for Step 2.
• Correct by the difference at the 15kHz signal portion between the measured level and the specification in Step 1.
• After the adjustment, record and play back newly recorded portion again and perform from Step 1 to check the frequency response.
• After the adjustment, perform Paragraph 7-14. Overall Frequency Response Adjustment (Metal) again and correct the effect on the metal part.</td><td>CH-1 : LV301/AU-142 (C-4A)
CH-2 : LV351/AU-142 (C-4A)</td></tr>
</table>

7-19. OVERALL LEVEL ADJUSTMENT (OXIDE)

Preparations for adjustment	Specifications	Adjustments
• CH-1/CH-2 AUDIO IN; 1 kHz, +4dBs • Insert a blank tape BCT-20G. • REC mode • Play back the recorded portion.	Step 1. CH-1; TP201/AU-142 (F-3) CH-2; TP202/AU-142 (E-3) −10.0±0.2dBs	(Check)
Audio oscillator Audio level meter	Step 2. If the specification is not satisfied, in the REC mode, measure and adjust the level at the following points corresponding to the difference between the measured value in Step 1 and the specified value. CH-1; TP401/AU-142 (D-3) CH-2; TP451/AU-142 (D-4) After the adjustment, record and play back newly recorded portion again and perform Step 1 to check the level.	CH-1 : RV304/AU-142 (D-2) CH-2 : RV354/AU-142 (D-3)
	Step 3. CH-1/CH-2 AUDIO OUT (at 600-ohm load) +4.0±0.4dBm	(Check)

7-20. OVERALL PHASE ADJUSTMENT (OXIDE)

Preparations for adjustment	Specifications	Adjustment
• CH-1/CH-2 AUDIO IN; 15 kHz, +4dBs • Insert a blank tape BCT-20G. • REC mode • Play back the recorded portion.	CH-1/CH-2 AUDIO OUT (at 600-ohm load)  	RV302//AU-142 (D-3)
Audio oscillator Oscilloscope: Mode .... X-Y	After adjusting RV301, repeat record and play back to reduce the phase difference to within ±5°.	

7-21. CONFI OUTPUT LEVEL ADJUSTMENT

7-21-1. CH-1 Adjustment

Preparations for adjustment	Specifications	Adjustment
Step 1. • CH-1 AUDIO IN; 1 kHz, +4dBs • CH-4 OUT SW; MON • CH-1 MONITOR SW; ON • CH-2 MONITOR SW; OFF • CONFI SW; ON • Insert a blank tape BCT-20G. • REC mode Audio oscillator Audio noise meter; Filter .... WIDE BAND	CH-4 AUDIO OUT (at 600-ohm load) Output level=+4±1dBm	◐RV801/AU-142 (F-3)
Step 2. Audio noise meter Filter .... DIN AUDIO • After the adjustment, return CH-1 MONITOR select switch to OFF.	CH-4 AUDIO OUT (at 600-ohm load) Difference from the output level in Step 1. $0.0\ ^{+0}_{-0.5}$ dB	(Check)

7-21-2. CH-2 Adjustment

Preparations for adjustment	Specifications	Adjustment
Step 1. • CH-1 AUDIO IN; 1 kHz, +4dBs • CH-4 OUT SW; MON • CH-1 MONITOR SW; OFF • CH-2 MONITOR SW; ON • CONFI SW; ON • Insert a blank tape BCT-20G. • REC mode Audio oscillator Audio noise meter: Filter .... WIDE BAND	CH-4 AUDIO OUT (at 600-ohm load) Output level=+4±1dBm	◐RV851/AU-142 (F-3)
Step 2. Audio noise meter Filter .... DIN AUDIO After the adjustment, return CH-2 MONITOR switch to OFF.	CH-4 AUDIO OUT (at 600-ohm load) Difference from the output level in Step 1. $0.0\ ^{+0}_{-0.5}$ dB	(Check)

7-22. DUB CROSSTALK CANCEL ADJUSTMENT

Step 1. CH-1 Adjustment

Preparations for adjustment	Specifications	Adjustments
• CH-1 AUDIO IN; 5 kHz, +4dBs • CH-2 AUDIO IN; No signal • Insert a BCT-20G cassette tape on which only CTL signals are recorded. • CH-1 DUB mode Audio oscillator Audio level meter	CH-2 AUDIO OUT (at 600-ohm load) Minimize the crosstalk (5kHz) from CH-1. The AUDIO OUT level difference between CH-1 and CH-2 should be 20dB or more. 〈Reference〉 Output level at the AUDIO OUT CH-1 (at 600-ohm load) Approx. +4dBm	◐ RV455/AU-142 (E-3) ◐ RV456/AU-142 (E-3) Adjust alternately.

Step 2. CH-2 Adjustment

Preparations for adjustment	Specifications	Adjustments
• CH-1 AUDIO IN; No signal • CH-2 AUDIO IN; 5 kHz, +4dBs • Insert a BCT-20G cassette tape on which only CTL signals are recorded. • CH-2 DUB mode Audio oscillator Audio level meter	CH-1 AUDIO OUT (at 600-ohm load) Minimize the crosstalk (5kHz) from CH-2. The AUDIO OUT level difference between CH-1 and CH-2 should be 20dB or more. 〈Reference〉 Output level at the AUDIO OUT CH-2 (at 600-ohm load) Approx. +4dBm	◐ RV405/AU-142 (E-3) ◐ RV406/AU-142 (E-3) Adjust alternately.

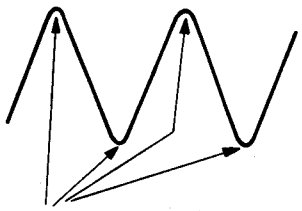
7-23. AFM REFERENCE LEVEL SETTING (2)

Preparations for adjustment	Specifications	Adjustments
• CH-3/CH-4 AUDIO IN; 400Hz, −20dBs • CH-3/CH-4 −60/−20/+4dB select SW; −20dB • EE mode Audio oscillator Audio level meter	CH-3/CH-4 AUDIO OUT (at 600-ohm load) +4±0.1dBm	◐ CH-3 REC VR on the front panel ◐ CH-4 REC VR on the front panel Once adjusted, the REC variable resistors should not be touched unless otherwise specified.

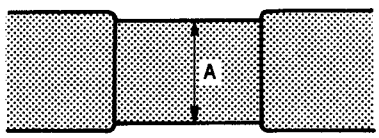
7-24. AFM CARRIER FREQUENCY ADJUSTMENT

Preparations for adjustment	Specifications	Adjustments
• CH-3/CH-4 AUDIO IN; No signal • EE mode	TP605/AU-142 (D-1) 310±1kHz	CH-3: ◐RV604/AU-142 (C-2)
Frequency counter	TP655/AU-142 (D-1) 540±1kHz	CH-4: ◐RV654/AU-142 (C-2)

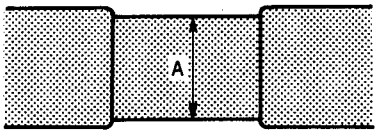
7-25. AFM CLIPPER LEVEL ADJUSTMENT

Preparations for adjustment	Specifications	Adjustment
• CH-3/CH-4 AUDIO IN; 400Hz, −0.5dBs • CH-3/CH-4 select SW; −60/−20/+4dB −20dB • EE mode Audio oscillator Audio level meter	CH-3; TP603/AU-142 (F-2) CH-4; TP653/AU-142 (F-2)  Adjust to just before the waveform begins to be clipped.	CH-3/CH-4: ◐RV602/AU-142 (F-2)

7-26. AFM SQUELCH SENSITIVITY ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustment
• Play back the 400Hz sine wave (25kHz deviation) signal portion on the alignment tape CR5-1B. Oscilloscope; TRIG TP705/AU-142	TP702/AU-142 (A-1) A=400±20mVp-p  Measure the voltage amplitude A on the channel showing a lower amplitude.	◐RV702/AU-142 (A-2)

7-27. AFM RECORDING CURRENT ADJUSTMENT

Preparations for adjustment	Specifications	Adjustment
Step 1. • CH-3/CH-4 AUDIO IN; No signal • Insert a blank tape BCT-20M. • REC mod • Play back the recorded portion. Oscilloscope: TRIG CN302-⑤ pin/AU-142 (E-1)	1. TP702/AU-142 (A-1) A=400±20mV  Measure the voltage amplitude A on the channel showing a lower amplitude. 2. TP701/AU-142 (E-1) Measure and record the level in the REC mode. If the specification is not satisfied, perform Step 2.	(Check)
Step 2. • CH-3/CH-4 AUDIO IN: No signal • Insert a blank tape BCT-20M. • REC mod • Play back the recorded portion. Oscilloscope	TP701/AU-142 (E-1) Correct the level at TP701/AU-12 by the ratio of the measured value of the width A in Step 1 to the specified value. If the measured value of A is lower than the specified value, raise the level at TP701/AU-142. If the measured value of A is higher than the specified value, lower the level at TP701/AU-142.	◐ RV701/AU-142 (E-1)
Step 3. • The same as for Step 1.	Repeat Step 1.	(Check)

7-28. AFM PB LEVEL ADJUSTMENT

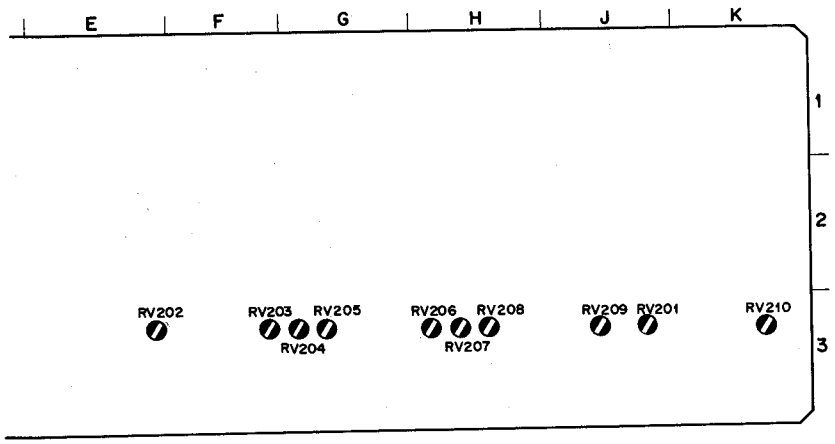
Machine conditions for adjustment	Specifications	Adjustments
• Play back the 400Hz sine wave (25kHz deviation) signal portion on the alignment tape CR5-1B.	Step 1. CH-3; TP703/AU-142 (A-1) CH-4; TP704/AU-142 (A-1) −11.4±0.2dBs	CH-3: ◐ RV603/AU-142 (B-1) CH-4: ◐ RV653/AU-142 (C-1)
Audio level meter	Step 2. CH-3/CH-4 AUDIO OUT (at 600-ohm load) +4.0±0.2dBm	CH-3: ◐ CH-3 PB VR on the front panel =RV307/VR-118 (D-2A) CH-4: ◐ CH-4 PB VR on the front panel =RV308/VR-118 (D-2A)

7-29. AFM DEVIATION ADJUSTMENT

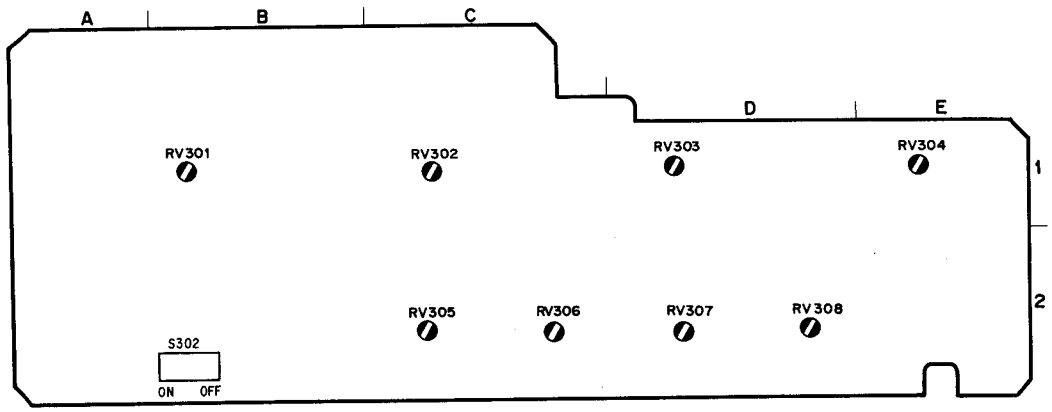
This adjustment should be made after performing, the AFM PB Level Adjustment and the AFM Recording Current Adjustment.

Preparations for adjustment	Specifications	Adjustments
Step 1. • CH-3/CH-4 AUDIO IN: 400Hz, −20dBs • CH-3/CH-4, −60/−20/+4dB select SW; −20dB (on the connector panel) • Insert a blank tape BCT-20M. • REC mode Audio oscillator Audio level meter	CH-3; TP603/AU-142 (F-2) CH-4; TP653/AU-142 (F-2) Measure and record the output level at TP603 and TP653.	
Step 2. • Play back the recorded portion.	CH-3/CH-4 AUDIO OUT (at 600-ohm load) +4.0±0.5dBm If the specification is not satisfied, perform Steep 3.	(Check)
Step 3. • (The same as for Step 1.)	Repeat Step 1. At this time, change the level at the following points of measurement from the measured values in Step 1 by the level difference with respect to +4.0dBm at the AUDIO OUT CH-1/CH-2 connector in Step 2; CH-3; TP603/AU-142 (F-2) CH-4; TP653/AU-142 (F-2) Then, perform Step 2. again for verification. 〈Reference〉 CH-3; TP605/AU-142 (D-1) CH-4; TP655/AU-142 (D-1) After the adjustment, the frequency deviation at the above points of measurement should be 25.0±0.2kHz	CH-3: ◐ RV601/AU-142 (E-2) CH-4: ◐ RV651/AU-142 (E-2)

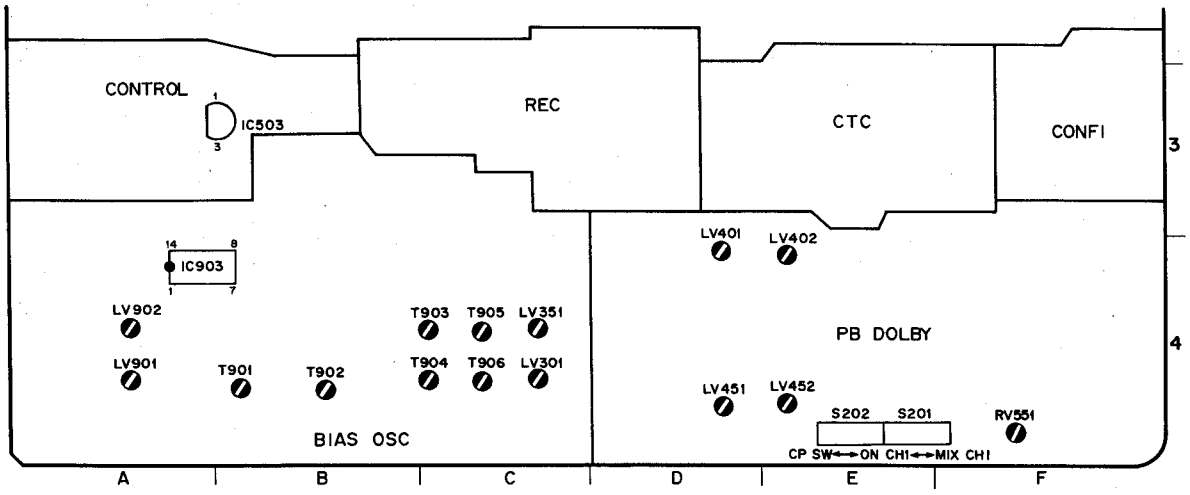
Locations of RVs on KY-207 board. (A SIDE)



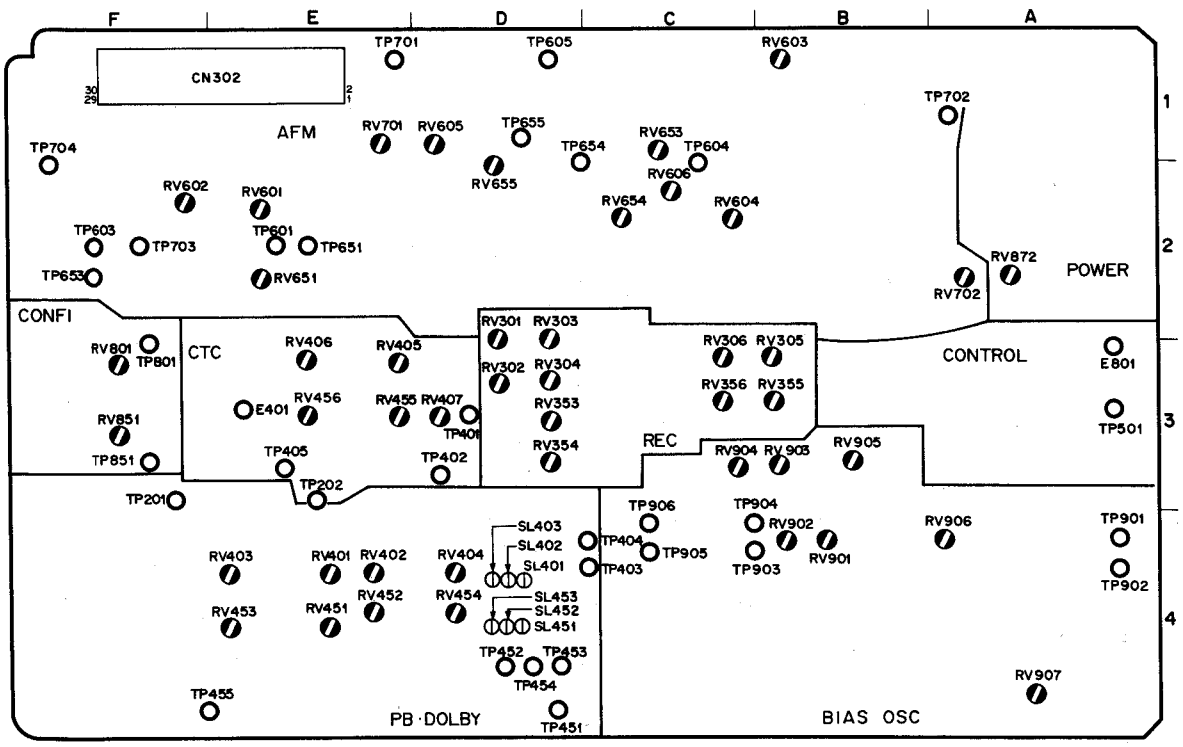
Locations S and RVs on VR-118 board (A SIDE)



Locations of ICs, LVs, Ss and Ts on AU-142 board. (A SIDE)



Location of CN, SLs, TPs and RVs on AU-142 board. (B SIDE)



SECTION 8
VIDEO SYSTEM ALIGNMENT

[Equipment Required]

- Dual trace oscilloscope
- Frequency counter
- NTSC signal generator (TEKTRONIX 1410 or equivalent)
- Component signal generator (TEKTRONIX TSG-300 (MOD-SP1) or equivalent)
- NTSC digital signal generator (TEKTRONIX 170A or equivalent)
- Sweep generator (SHIBASOKU VS-12 or equivalent)
- TV test signal generator (SHIBASOKU TG-7 or equivalent)
- Vectorscope
- Waveform monitor
- Component waveform monitor (TEKTRONIX WFM-300 or equivalent)
- Waveform vector monitor (TEKTRONIX 1750 or equivalent)
- Spectrum analyzer
- Digital voltmeter
- Shorting clip
- Blank tape (BCT-20G or equivalent)
- Blank tape (BCT-20M or equivalent)
- Alignment tape CR5-2A (8-960-097-44)

Contents

TIME min. sec	VIDEO TRACK
0 : 00	75% Color Bars
3 : 00	Multi Burst
6 : 00	Bowtie & 12.5T
9 : 00	Pulse & Bar
11 : 00	Quad Phase
13 : 00	C-Monoscope Switching position is shifted.
15 : 00	

- Alignment tape CR5-1B (8-960-096-41)

Contents

TIME min. sec	VIDEO TRACK	AFM
0 : 00	RF Sweep	No-Signal
2 : 00	60% H Sweep (CTDM)	
5 : 00	Pulse & Bar (CTDM)	
8 : 00	Multi Burst	
11 : 00	Pulse & Bar	
14 : 00	75% Color Bars	400 Hz SINE WAVE 25 kHz DEVIATION
16 : 30		75 kHz DEVIATION
17 : 00	50% Bowtie & 12.5T	No-Signal
19 : 00	Line 17 Signal	
22 : 00	Quad Phase	
24 : 00	Flat Field	
26 : 00	75% Color Bar with Dropout	
28 : 00	Composite V Sweep with VISC	
30 : 00		

[**Switch Setting**]

Connector Panel

- MODE SW; PB/EE
- VIDEO SW; LINE
- CONFI SW; OFF
- SUPERIMPOSE SW; OFF
- VIDEO LEVEL VR; center clicked position

Left Side Panel

- TRACKING VR; center clicked position
- PB VIDEO LEVEL VR; center clicked position

CC-47 Board

- S3/CC-47 (D-1B); AUTO

These switches should not be touched unless otherwise specified.

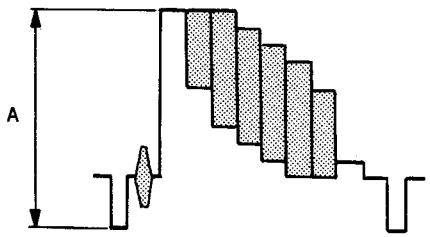
The Video board (VRP-1) and TBC board (TBC-19) should be extended with extension cables if necessary.

[**NOTE**]

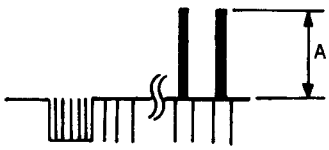
1. When replacing the VR described below, be sure to turn the VR fully counterclockwise direction viewing from the component side.
   RV614 on the VRP-1 Board
2. Don't adjust LV801 and LV802 on the TBC-19 board. They are for factory adjustment only. If they were adjusted, perform para. 8-3-30 U/V axis adjustmemt.

8-1. VRP RECORD SYSTEM

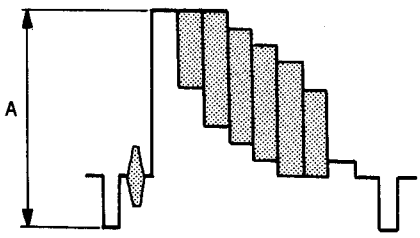
8-1-1. Through EE Output Level Adjustment

Preparations for adjustment	Specifications	Adjustment
• VIDEO IN; 75% color bars • CAMERA/LINE SW; LINE • MODE SW; SAVE • VIDEO LEVEL VR; center click • EE mode NTSC signal generator Waveform monitor	VIDEO OUT 1 (terminated with 75Ω)  A=1.00±0.01Vp-p	◐RV3/VRP-1 (A-5)

8-1-2. Composite VITC Mix Level Adjustment

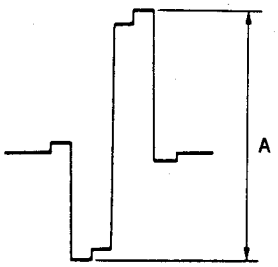
Preparations for adjustment	Specifications	Adjustment
• VIDEO IN; 75% color bars • CAMERA/LINE SW; LINE • MODE SW; SAVE • VITC REC SW; ON (Front Panel) • EE mode NTSC signal generator Waveform monitor	VIDEO OUT 1 (terminated with 75Ω)  A=80±2 IRE	◐RV2/VRP-1 (A-6)

8-1-3. Composite A/D Input Level Adjustment

Preparations for adjustment	Specifications	Adjustment
• VIDEO IN; 75% color bars • CAMERA/LINE SW; LINE • MODE SW; PB/EE • EE mode NTSC signal generator Oscilloscope	TP101/VRP-1 (B-2)  A=1.53±0.01Vp-p	◐RV103/VRP-1 (A-2)

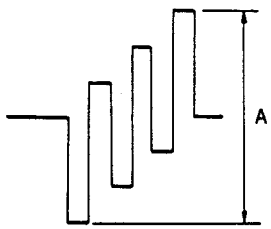
8-1-4. Component R-Y A/D Input Level Adjustment

After this adjustment, be sure to perform para. 8-1-16. CTDM MOD Input Level Adjustmemt.

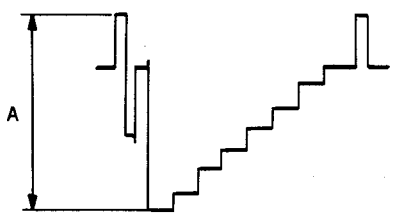
Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE • EE mode Oscilloscope	TP101/VRP-1 (B-2)  A=1.37±0.03Vp-p	◐RV102/VRP-1 (A-3)

8-1-5. Component B-Y A/D Input Level Adjustment

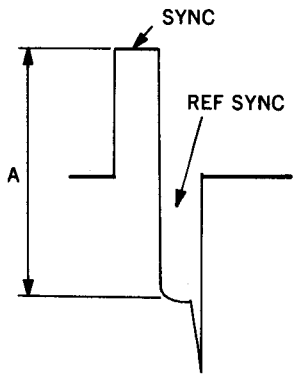
After this adjustment, be sure to perform para. 8-1-16. CTDM MOD Input Level Adjustmemt.

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE • EE mode Oscilloscope	TP102/VRP-1 (A-1)  A=1.37±0.03Vp-p	◐RV104/VRP-1 (A-1)

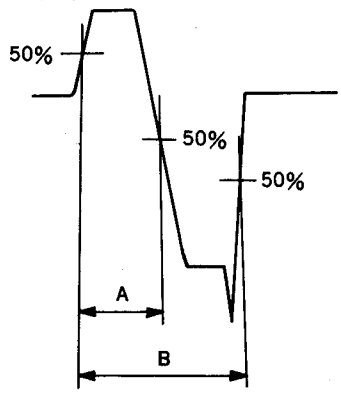
8-1-6. Y MOD Input Level Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE • EE mode Oscilloscope TRIG....CH-1	TP302/VRP-1 (F-5)  A=1.00±0.005Vp-p	◐RV302/VRP-1 (F-6)

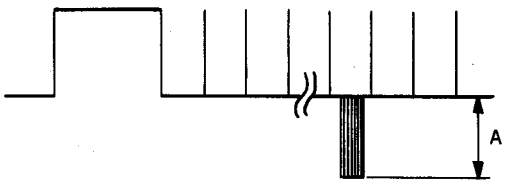
8-1-7. Y REF SYNC Mix Level Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE • EE mode NTSC signal generator Oscilloscope	TP302/VRP-1 (F-5)  A=0.643±0.01Vp-p	◐RV301/VRP-1 (F-5)

8-1-8. Y REF SYNC Position/Width Adjustment

Preparations for adjustment	Specifications	Adjustments
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE • EE mode NTSC signal generator Oscilloscope	TP302/VRP-1 (F-5)  A=2.65±0.01μs B=5.00±0.01μs	SPEC. A: ◐RV203/VRP-1 (E-1) SPEC. B: ◐RV204/VRP-1 (E-7)

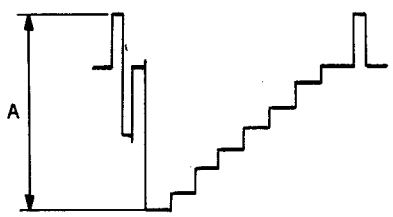
8-1-9. Component Y VITC Mix Level Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE • EE mode • VITC REC SW; ON NTSC signal generator oscilloscope • After adjustment, VITC REC SW; OFF	TP302/VRP-1 (F-5)  A=0.57±0.05Vp-p	◐RV1/VRP-1 (A-6)

8-1-10. H-LOCK VCO LOCK Point Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE • EE mode NTSC signal generator Oscilloscope	TP207/VRP-1 (F-4) 2.0±1.0Vdc	◐ LV201/VRP-1 (E-3)

8-1-11. Composite Y D/A Output Level Adjustment

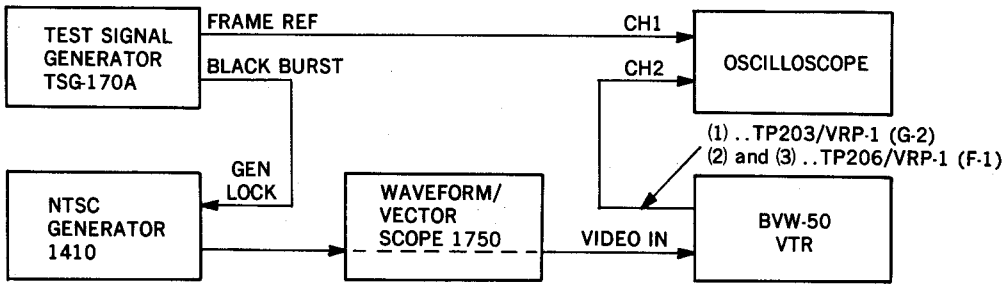
Preparations for adjustment	Specifications	Adjustment
• VIDEO IN; 75% color bars • CAMERA/LINE SW; LINE • MODE SW; PB/EE • EE mode NTSC signal generator Oscilloscope	TP302/VRP-1 (F-5)  A=1.00±0.005Vp-p	◐RV105/VRP-1 (C-3)

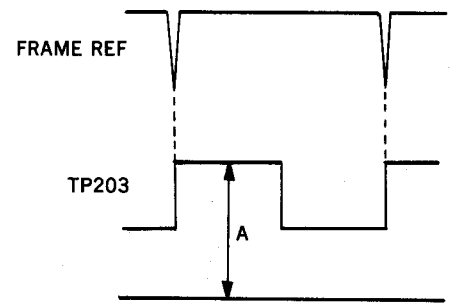
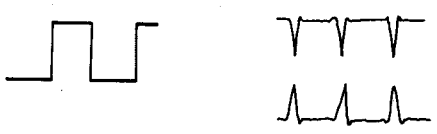
8-1-12. BURST LOCK Phase Adjustment

Preparations for adjustment	Specifications	Adjustment
• VIDEO IN; 75% color bars • CAMERA/LINE SW; LINE • MODE SW; PB/EE • EE mode NTSC signal generator Oscilloscope	TP208/VRP-1 (F-3) 2.0±1.0Vdc	◐RV201/VRP-1 (G-3)

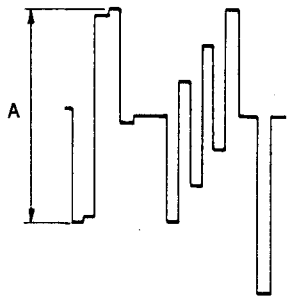
8-1-13. SCH DET Adjustment

[CONNECTION]

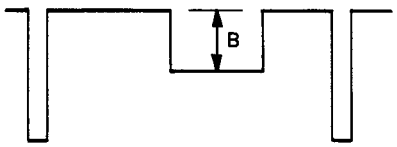


Preparations for adjustment	Specifications	Adjustments
• VIDEO IN; 75% color bars • CAMERA/LINE SW; LINE • MODE SW; PB/EE • EE mode • (1) NTSC GEN.1410 OUT; SCH 0° (Display on the W.F.M1750)	(1) TP203/VRP-1 (G-2)  A=1.5±0.3Vdc	(1): ◐S201/VRP-1 (F-1) After adjustment, set RVs as shown below. • RV211/VRP-1 (F-2); CCW max. • RV212/VRP-1 (G-2); CW max.
• (2) NTSC GEN.1410 OUT; SCH+70° • (3) NTSC GEN.1410 OUT; SCH−70°	(2), (3) TP206/VRP-1 (F-1) Pulses should occur intermittently. Pulses occur. Pulses occur intermittently. 	(2): ◐RV212/VRP-1 (G-2) (3): ◐RV211/VRP-1 (F-2)

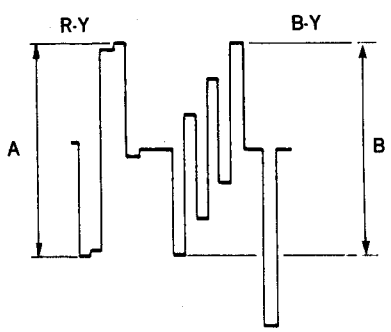
8-1-14. DEC CTDM MOD Input Level Adjustment

Preparations for adjustment	Specifications	Adjustment
• VIDEO IN; 75% color bars • CAMERA/LINE SW; LINE • MODE SW; PB/EE NTSC signal generator (TSG-170A) Oscilloscope	TP402/VRP-1 (D-5)  A=0.700±0.005Vp-p	◐RV106/VRP-1 (C-4)

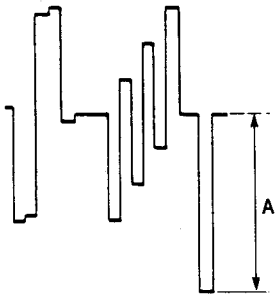
8-1-15. C Limiter Adjustment

Preparations for adjustment	Specifications	Adjustment
• VIDEO IN; 100% yellow • CAMERA/LINE SW; LINE • MODE SW; PB/EE Signal generator (TG-7) Oscilloscope	TP402/VRP-1 (D-5)  B=0.51±0.01Vp-p	◐RV107/VRP-1 (C-4)

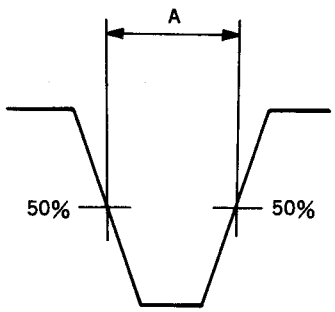
8-1-16. CTDM MOD Input Level Adjustment

Preparations for adjustment	Specifications	Adjustments
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Signal generator (TSG-300) Oscilloscope	TP402/VRP-1 (D-4)  A=0.700±0.005Vp-p B=0.700±0.005Vp-p	SPEC. A: ◐RV102/VRP-1 (A-3) SPEC. B: ◐RV104/VRP-1 (A-1)

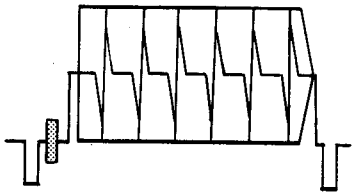
8-1-17. C REF-SYNC Mix Level Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Signal generator (TSG-300) Oscilloscope	TP402/VRP-1 (D-4)  A=0.735±0.01Vp-p	◐RV401/VRP-1 (D-5)

8-1-18. C REF-SYNC Width Adjustment

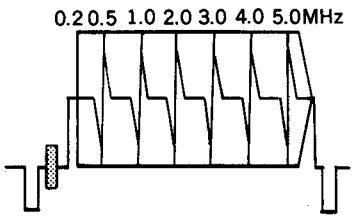
Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Signal generator (TSG-300) Oscilloscope	TP402/VRP-1 (D-4)  A=1.90±0.05μs	◐RV210/VRP-1 (F-1)

8-1-19. Y Slew Rate Adjustment (Metal)

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 100% H sweep • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Signal generator (TSG-300) Waveform monitor	TP302/VRP-1 (F-5) 0.2 0.5 1.0 2.0 3.0 4.0 5.0MHz 	◐RV303/VRP-1 (F-6)

FREQUENCY (MHz)	AMPLITUDE (%)
0.2	100 (REF)
5.0	96±1

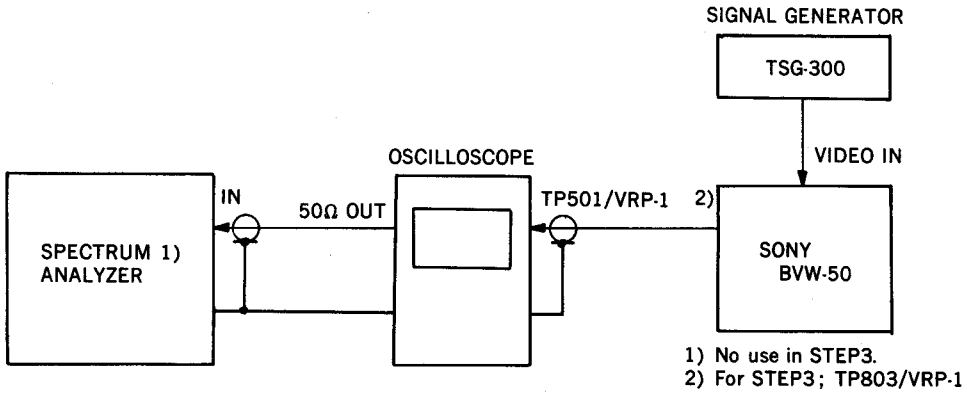
8-1-20. Y Slew Rate Adjustment (Oxide)

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 100% H sweep • CAMERA/LINE SW; CAMERA • Insert a BCT-20G blank tape. • MODE SW; PB/EE Signal generator (TSG-300) Waveform monitor	TP302/VRP-1 (F-5) 0.2 0.5 1.0 2.0 3.0 4.0 5.0MHz 	◐RV304/VRP-1 (E-6)

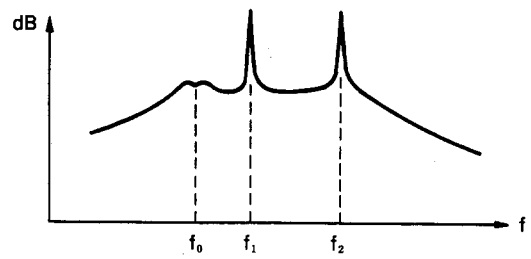
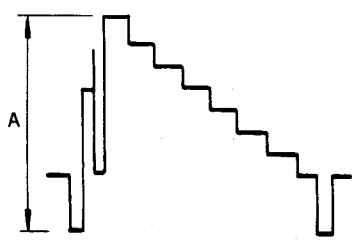
FREQUENCY (MHz)	AMPLITUDE (%)
0.2	100 (REF)
5.0	87±1

8-1-21. Y Deviation Adjustment

[CONNECTION]

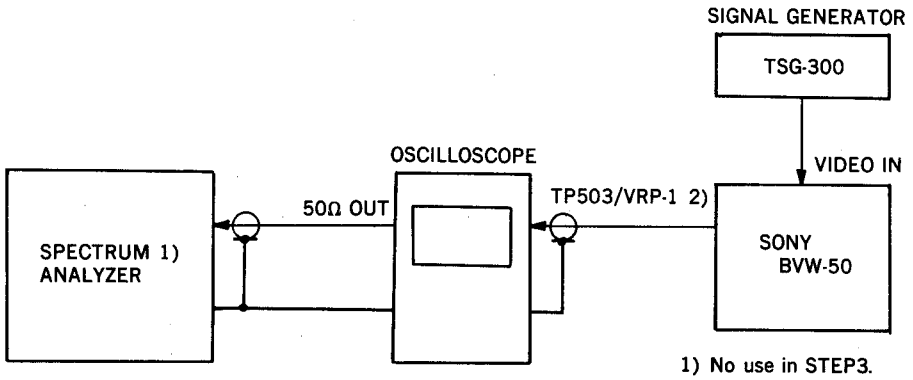


Prior to this adjustment, perform section 8-2-18. Y DEMOD Gain adjustment (metal) and 8-2-19. Y DEMOD Gain adjustment (oxide).

Preparations for adjustment	Specifications	Adjustments
STEP1. (metal) • CAMERA IN; 100% flat field • CAMERA/LINE SW; CAMERA • Insert a BCT-20M blank tape. • MODE SW; PB/EE Signal generator (TSG-300) Spectrum analyzer	TP501/VRP-1 (E-7)  CARRIER; f_1=6.3±0.05MHz DEVIATION; f_2-f_1=1.4±0.05MHz (Ref. : f_0=5.7±0.05MHz)	CARRIER f_1 Adjust: ◐RV307/VRP-1 (D-6) DEVIATION (f_2-f_1) Adjust: ◐RV306/VRP-1 (D-5)
STEP2. (oxide) • Insert a BCT-20G blank tape. • OTHER; Same as STEP1.	CARRIER: f_1=5.0±0.05MHz (Ref. : f_2-f_1=1.4±0.05MHz f_0=4.4±0.05MHz)	CARRIER f_1 Adjust: ◐RV308/VRP-1 (D-6)
STEP3. • CAMERA IN; 75% color bars • Perform the self-recording/play back with both BCT-20M and BCT-20G blank tapes. Signal generator (TSG-300) Oscilloscope	TP803/VRP-1 (H-2)  A=500±7mVp-p	When the specification is not satisfied, carry out the STEP1 and STEP2 again.

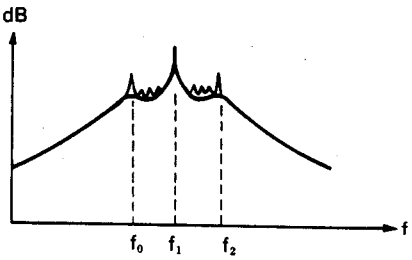
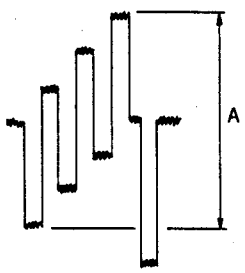
8-1-22. C Deviation Adjustment

[CONNECTION]

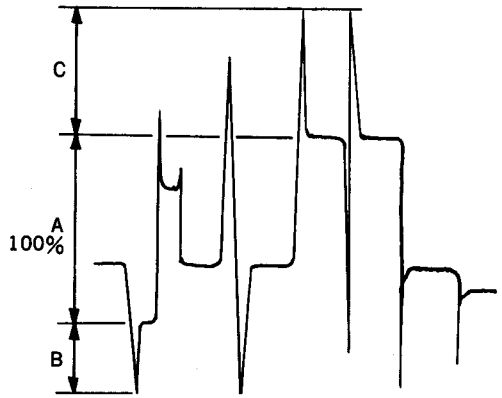


1) No use in STEP3.
2) For STEP3; TP903/VRP-1

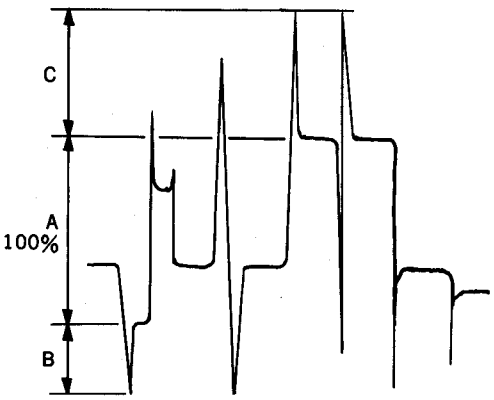
Prior to this adjustment, perform section 8-2-22. C DEMOD Gain adjustment (metal) and 8-2-23. C DEMOD Gain adjustment (oxide).

Preparations for adjustment	Specifications	Adjustments
STEP1. (metal) • CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • Insert a BCT-20M blank tape. • MODE SW; PB/EE Signal generator (TSG-300) Spectrum analyzer	TP503/VRP-1 (D-7)  CARRIER; f_1=5.3±0.05MHz DEVIATION; f_2-f_1=0.5±0.005MHz (Ref. : f_0=4.8±0.05MHz)	CARRIER f_1 Adjust: ◐RV407/VRP-1 (B-6) DEVIATION (f_2-f_1) Adjust: ◐RV406/VRP-1 (B-5)
STEP2. (oxide) • Insert a BCT-20G blank tape. • OTHERS; Same as STEP1.	CARRIER: f_1=4.5±0.005MHz (Ref. : f_2=5.0±0.05MHz f_0=4.0±0.05MHz)	CARRIER f_1 Adjust: ◐RV408/VRP-1 (B-6)
STEP3. • CAMERA IN; 75% color bars • Perform the self-recording/play back with both BCT-20M and BCT-20G blank tapes. Signal generator (TSG-300) Oscilloscope	TP903/VRP-1 (J-2)  A=350±5mVp-p	When the specification is not satisfied, carry out the STEP1 and STEP2 again.

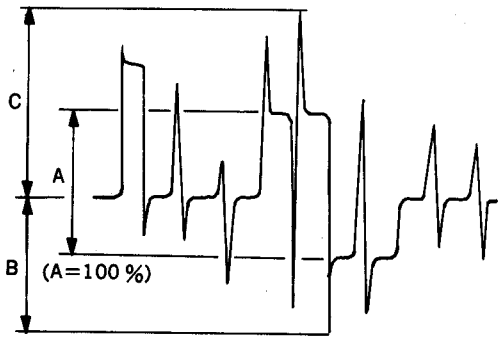
8-1-23. Y White/Dark Clip Adjustment (Metal)

Preparations for adjustment	Specifications	Adjustments
STEP1. • CAMERA IN; Pulse & bar • CAMERA/LINE SW; CAMERA • Insert a BCT-20M blank tape. • MODE SW; PB/EE Signal generator (TSG-300) Oscilloscope	TP303/VRP-1 (E-6)  B=100±2.5% (A=100%)	◐RV309/VRP-1 (F-7)
STEP2. • Connect TP307/VRP-1 (D-5) and GND with a shorting clip. • OTHERS; Same as STEP1. • After adjustment, remove the shorting clip.	TP303/VRP-1 (E-6) C=150±2.5% (A=100%)	◐RV311/VRP-1 (E-7)

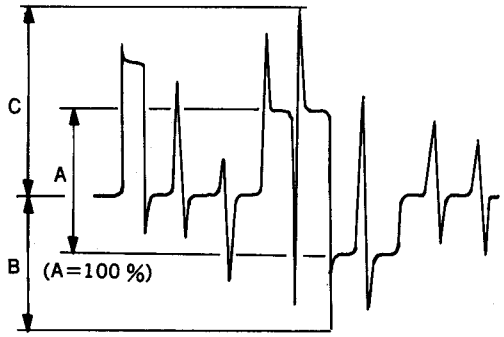
8-1-24. Y White/Dark Clip Adjustment (Oxide)

Preparations for adjustment	Specifications	Adjustments
• CAMERA IN; Pulse & bar • CAMERA/LINE SW; CAMERA • Insert a BCT-20G blank tape. • MODE SW; PB/EE Signal generator (TSG-300) Oscilloscope	TP303/VRP-1 (E-6)  (1) B=65±2.5% (A=100 %) (2) C=150±2.5% (A=100 %)	SPEC. (1): ◐RV310/VRP-1 (E-7) SPEC. (2): ◐RV312/VRP-1 (D-7)

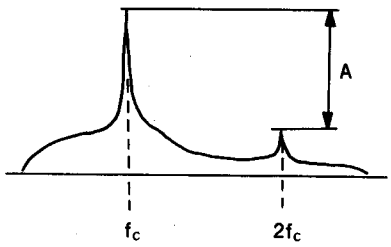
8-1-25. C High/Low Clip Adjustment (Metal)

Preparations for adjustment	Specifications	Adjustments
STEP1. • CAMERA IN; Pulse & bar • CAMERA/LINE SW; CAMERA • Insert a BCT-20M blank tape. • MODE SW; PB/EE Signal generator (TSG-300) Oscilloscope	TP403/VRP-1 (C-6)  B=220±2.5% (A=100%)	◐RV409/VRP-1 (C-6) ◐RV411/VRP-1 (D-6)
STEP2. • Connect TP407/VRP-1 (B-5) and GND with a shorting clip. • OTHERS; Same as STEP1. • After adjustment, remove the shorting clip.	TP403/VRP-1 (C-6) C=305±2.5% (A=100%)	◐RV411/VRP-1 (D-6)

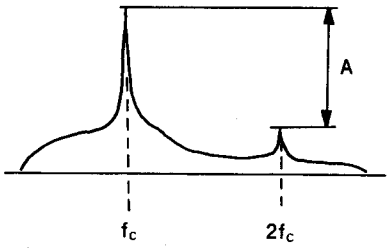
8-1-26. C High/Low Clip Adjustment (Oxide)

Preparations for adjustment	Specifications	Adjustments
STEP1. • CAMERA IN; Pulse & bar • CAMERA/LINE SW; CAMERA • Insert a BCT-20G blank tape. • MODE SW; PB/EE Signal generator (TSG-300) Oscilloscope	TP403/VRP-1 (C-6) B=175±2.5% (A=100%)  	◐RV410/VRP-1 (C-6)
STEP2. • Connect TP407/VRP-1 (B-5) and GND with a shorting clip. • OTHERS; Same as STEP1. • After adjustment, remove the shorting clip.	TP403/VRP-1 (C-6) C=305±2.5%	◐RV412/VRP-1 (D-6)

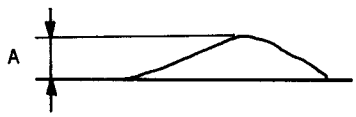
8-1-27. Y FM Carrier Balance Adjustment

Preparations for adjustment	Specifications	Adjustments
• CAMERA IN; 50% flat field • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE • (1) Insert a BCT-20M blank tape. • (2) After adjustment (1), insert a BCT-20G blank tape. Spectrum analyzer; Connected to the oscilloscope output (50Ω). Signal generator (TSG-300) Oscilloscope	TP501/VRP-1 (E-7) METAL f_c 7.0MHz OXIDE f_c 5.7MHz Minimize second higher harmonic level.  (1) A≧45dB (2) A≧40dB	SPEC. (1): ◐RV313/VRP-1 (D-6) SPEC. (2): (CHECK)

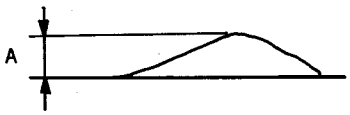
8-1-28. C FM Carrier Balance Adjustment

Preparations for adjustment	Specifications	Adjustments
• CAMERA IN; flat field (CHROMA PEDESTAL) • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE • (1) Insert a BCT-20M blank tape. • (2) After adjustment (1), insert a BCT-20G blank tape. Spectrum analyzer; Connected to the oscilloscope output (50Ω). Signal generator (TSG-300) Oscilloscope	TP503/VRP-1 (E-7) METAL f_c 5.3MHz OXIDE f_c 4.5MHz Minimize second higher harmonic level.  (1) A≧45dB (2) A≧40dB	SPEC. (1): ◐RV413/VRP-1 (B-6) SPEC. (2): (CHECK)

8-1-29. Y REC HF Slice Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 100% H sweep • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Signal generator (TSG-300) Oscilloscope	TP308/VRP-1 (E-6)  A=140±2mV	◐RV314/VRP-1 (E-6)

8-1-30. C REC HF Slice Adjustment

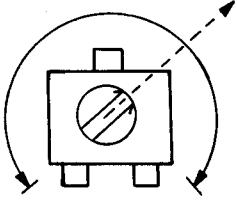
Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 100% H sweep • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Signal generator (TSG-300) Oscilloscope	TP408/VRP-1 (D-5)  A=110±2mV	◐RV414/VRP-1 (D-6)

8-2. VRP PLAY BACK SYSTEM

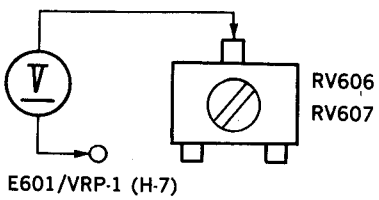
8-2-1. Y, C 1st Cosine Equalizer Tentative Adjustment

Preparations for adjustment	Specifications	Adjustments
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE	Set the following VRs to their mechanical center position. RV601/VRP-1 RV602/VRP-1 RV603/VRP-1 RV604/VRP-1 RV701/VRP-1 RV702/VRP-1 RV703/VRP-1 RV704/VRP-1	◐RV601/VRP-1 (H-7) ◐RV602/VRP-1 (H-7) ◐RV603/VRP-1 (H-7) ◐RV604/VRP-1 (H-7) ◐RV701/VRP-1 (J-7) ◐RV702/VRP-1 (K-7) ◐RV703/VRP-1 (J-7) ◐RV704/VRP-1 (K-7)

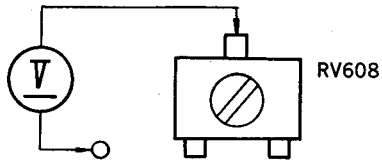
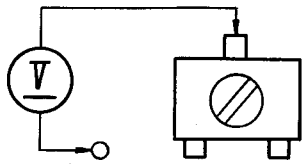
8-2-2. Y RF Equalizer Adjustment (Metal)

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE	Set the RV605/VRP-1 to the position shown below. 2 o'clock position 	◐RV605/VRP-1 (G-6)

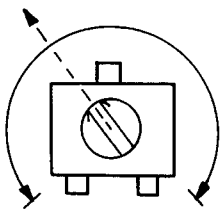
8-2-3. Y A-CH Cosine Main Adjustment

Preparations for adjustment	Specifications	Adjustments
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Digital voltmeter	RV606/VRP-1 ARM VOLTAGE RV607/VRP-1 ARM VOLTAGE DIGITAL VOLTMETER  E601/VRP-1 (H-7) V=4.15±0.02Vdc	◐RV606/VRP-1 (H-6) ◐RV607/VRP-1 (H-6)

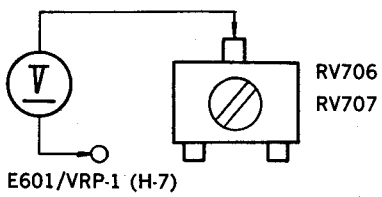
8-2-4. Y Cosine Sub Adjustment

Preparations for adjustment	Specifications	Adjustments
STEP 1. • CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Digital voltmeter	RV608/VRP-1 ARM VOLTAGE  E601/VRP-1 (H-7) V=3.25±0.02Vdc	◐RV608/VRP-1 (G-7)
STEP 2. • Insert a BCT-20G (oxide) blank tape. • OTHERS; Same as STEP 1.	RV609/VRP-1 ARM VOLTAGE  E601/VRP-1 (H-7) V=2.75±0.02Vdc	◐RV609/VRP-1 (G-6)

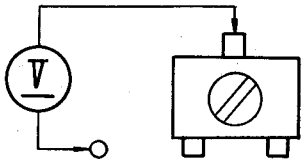
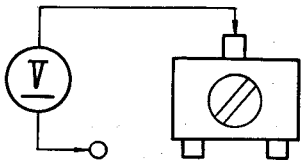
8-2-5. C RF Equalizer Adjustment (Metal)

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE	Set the RV705/VRP-1 to the position shown below. 11o'clock position 	◐RV705/VRP-1 (J-6)

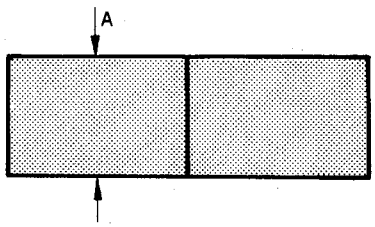
8-2-6. C A-CH Cosine Main Adjustment

Preparations for adjustment	Specifications	Adjustments
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Digital voltmeter	RV706/VRP-1 ARM VOLTAGE RV707/VRP-1 ARM VOLTAGE  E601/VRP-1 (H-7) V=3.00±0.02Vdc	◐RV706/VRP-1 (J-7) ◐RV707/VRP-1 (K-7)

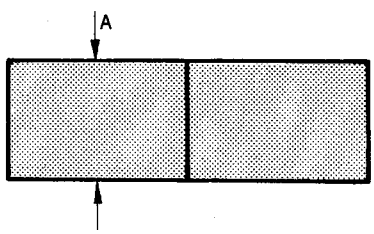
8-2-7. C Cosine Sub Adjustment

Preparations for adjustment	Specifications	Adjustments
STEP 1. • CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Digital voltmeter	RV708/VRP-1 ARM VOLTAGE  E601/VRP-1 (H-7) V=2.05±0.02Vdc	◐RV708/VRP-1 (J-7)
STEP 2. • Insert a BCT-20G (oxide) blank tape. • OTHERS; Same as STEP 1.	RV709/VRP-1 ARM VOLTAGE  E601/VRP-1 (H-7) V=3.15±0.02Vdc	◐RV709/VRP-1 (J-6)

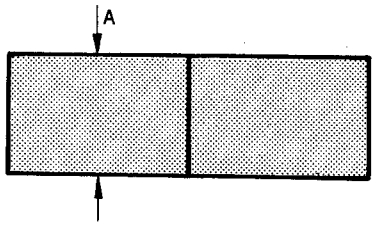
8-2-8. Y RF Level Adjustment (Metal)

Preparations for adjustment	Specifications	Adjustment
• AGC SW S2/VRP-1 (H-6); ON • CONFI SW; OFF • Play back the flat field signal portion of the alignment tape CR5-1B. • TRACON VR/Left side panel; center click Oscilloscope TRIG....TP610/VRP-1 (H-9)	TP605/VRP-1 (G-6)  A=200±20mVp-p	◐RV610/VRP-1 (G-8)

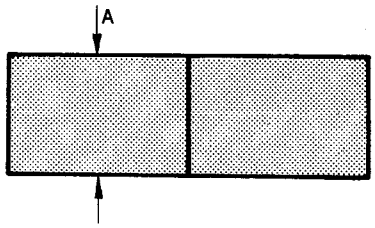
8-2-9. Y RF Level Adjustment (Oxide)

Preparations for adjustment	Specifications	Adjustment
• AGC SW S2/VRP-1 (H-6); ON • CONFI SW; OFF • Play back the color bar signal portion of the alignment tape CR5-2A. • TRACON VR/Left side panel; center click Oscilloscope TRIG....TP610/VRP-1 (H-9)	TP605/VRP-1 (G-6)  A=200±20mVp-p	◐RV611/VRP-1 (G-7)

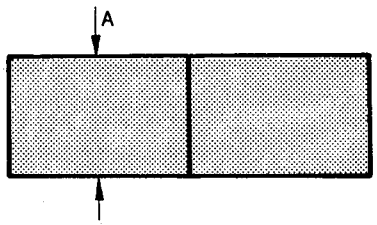
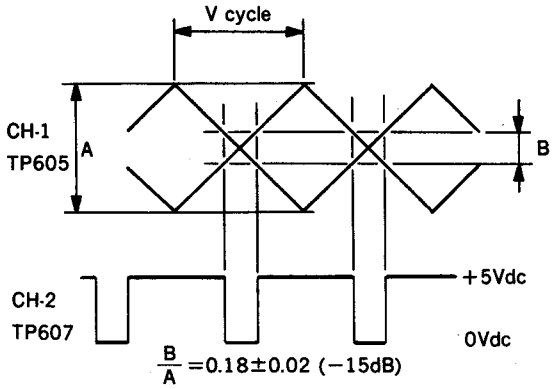
8-2-10. C RF Level Adjustment (Metal)

Preparations for adjustment	Specifications	Adjustment
• Play back the flat field signal portion of the alignment tape CR5-1B. Oscilloscope TRIG....TP701/VRP-1 (H-9)	TP705/VRP-1 (J-6)  A=200±20mVp-p	◐RV710/VRP-1 (J-8)

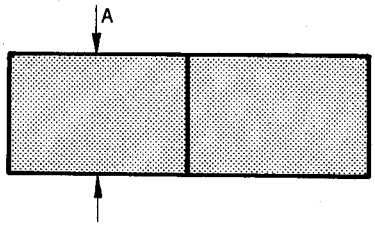
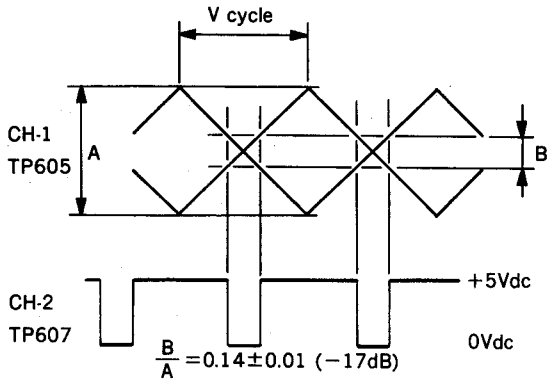
8-2-11. C RF Level Adjustment (Oxide)

Preparations for adjustment	Specifications	Adjustment
• Play back the color bar signal portion of the alignment tape CR5-2A. Oscilloscope TRIG....TP701/VRP-1 (H-9)	TP705/VRP-1 (J-6)  A=200±20mVp-p	◐RV711/VRP-1 (J-7)

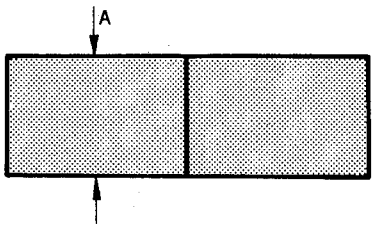
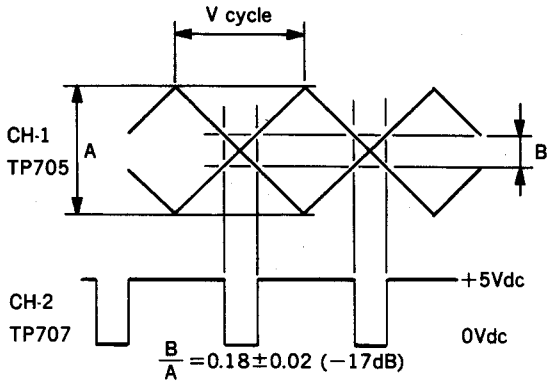
8-2-12. Y DOC Sensitivity Adjustment (Oxide)

Preparations for adjustment	Specifications	Adjustments
STEP1. • MODE SW; PB • AGC SW S2/VRP-1 (H-6); OFF • Play back the color bar signal portion of the alignment tape CR5-2A. Oscilloscope	TP605/VRP-1 (G-6)  A; Maximize (≒200mV)	◐ TRACON VR/Left side panel
STEP2. • AGC SW S2/VRP-1 (H-6); ON • PB PAUSE mode Oscilloscope CH-1....TP605/VRP-1 (G-6) CH-2....TP607/VRP-1 (G-8) TRIG....TP610/VRP-1 (H-9)	TP605/VRP-1 (G-6) TP607/VRP-1 (G-8)  $\frac{B}{A}$ =0.18±0.02 (−15dB)	◐ RV612/VRP-1 (G-8) Adjust the RV612/VRP-1 to meet the SPEC B when pulses at the TP607/VRP-1 occur.
STEP3. • Same as STEP2. Video monitor	VIDEO OUT 1 No noise appears near the guard band on the video monitor.	(CHECK)
STEP4. • Play back the color bar signal portion of the alignment tape CR5-2A. Video monitor	VIDEO OUT 1 The color bars are reproduced correctly on the video monitor.	(CHECK)

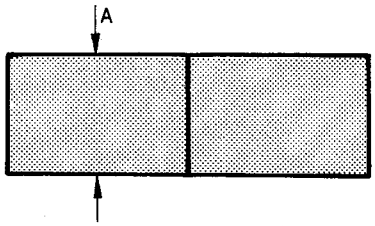
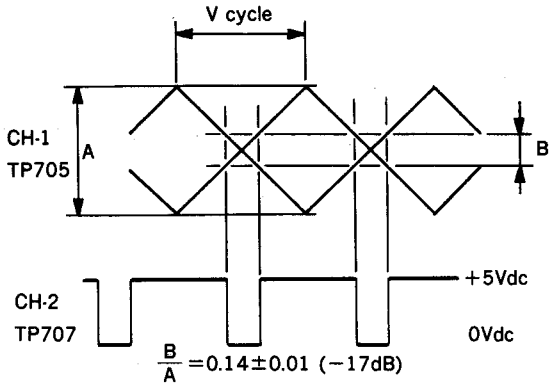
8-2-13. Y DOC Sensitivity Adjustment (Metal)

Preparations for adjustment	Specifications	Adjustments
STEP1. • MODE SW; PB • AGC SW S2/VRP-1 (H-6); OFF • Play back the flat field signal portion of the alignment tape CR5-1B. Oscilloscope	TP605/VRP-1 (G-6)  A; Maximize (≒200mV)	◐TRACON VR/Left side panel
STEP2. • AGC SW S2/VRP-1 (H-6); ON • PB PAUSE mode Oscilloscope CH-1....TP605/VRP-1 (G-6) CH-2....TP607/VRP-1 (G-8) TRIG....TP610/VRP-1 (H-9)	TP605/VRP-1 (G-6) TP607/VRP-1 (G-8)  	◐RV613/VRP-1 (G-8) Adjust the RV613/VRP-1 to meet the SPEC B when pulses at the TP607/VRP-1 occur.
STEP3. • Same as STEP2. Video monitor	VIDEO OUT 1 No noise appears near the guard band on the video monitor.	(CHECK)
STEP4. • Play back the dropout signal portion of the alignment tape CR5-1B. Video monitor	VIDEO OUT 1 Dropout portion is compensated on the video monitor.	(CHECK)

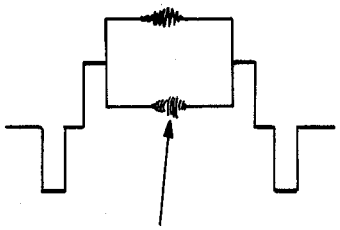
8-2-14. C DOC Sensitivity Adjustment (Oxide)

Preparations for adjustment	Specifications	Adjustments
STEP1. • MODE SW; PB • AGC SW S2/VRP-1 (H-6); OFF • Play back the color bar signal portion of the alignment tape CR5-2A. Oscilloscope	TP705/VRP-1 (J-6)  A; Maximize (≒200mV)	◐TRACON VR/Left side panel
STEP2. • AGC SW S2/VRP-1 (H-6); ON • PB PAUSE mode Oscilloscope CH-1....TP705/VRP-1 (J-6) CH-2....TP707/VRP-1 (J-8) TRIG....TP701/VRP-1 (H-9)	TP705/VRP-1 (J-6) TP707/VRP-1 (J-8)  $\frac{B}{A}$ =0.18±0.02 (−17dB)	◐RV712/VRP-1 (G-8) Adjust the RV712/VRP-1 to meet the SPEC B when pulses at the TP707/VRP-1 occur.
STEP3. • Same as STEP2. Video monitor	VIDEO OUT 1 No color noise appears near the guard band on the video monitor.	(CHECK)
STEP4. • Play back the color bar signal portion of the alignment tape CR5-2A. Video monitor	VIDEO OUT 1 The color bars are reproduced correctly on the video monitor.	(CHECK)

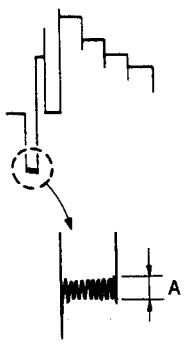
8-2-15. C DOC Sensitivity Adjustment (Metal)

Preparations for adjustment	Specifications	Adjustments
STEP1. • MODE SW; PB • AGC SW S2/VRP-1 (H-6); OFF • Play back the flat field signal portion of the alignment tape CR5-1B. Oscilloscope	TP705/VRP-1 (J-6)  A; Maximize (≒200mV)	◐TRACON VR/Left side panel
STEP2. • AGC SW S2/VRP-1 (H-6); ON • PB PAUSE mode Oscilloscope CH-1....TP705/VRP-1 (J-6) CH-2....TP707/VRP-1 (J-8) TRIG....TP701/VRP-1 (H-9)	TP705/VRP-1 (J-6) TP707/VRP-1 (J-8)  $\frac{B}{A}$ =0.14±0.01 (−17dB)	◐RV713/VRP-1 (J-8) Adjust the RV713/VRP-1 to meet the SPEC B when pulses at the TP707/VRP-1 occur.
STEP3. • Same as STEP2. Video monitor	VIDEO OUT 1 No color noise appears near the guard band on the video monitor.	(CHECK)
STEP4. • Play back the dropout signal portion of the alignment tape CR5-1 B. Video monitor	VIDEO OUT 1 Dropout portion is compensated on the video monitor.	(CHECK)

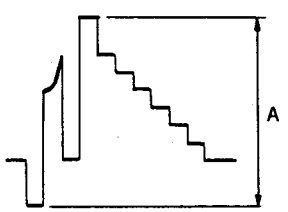
8-2-16. Y EE DEMOD Balance Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 60% H sweep • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE • Signal generator (TSG-300) Oscilloscope	TP803/VRP-1 (H-2)  Minimize moire in 3MHz portion. (less than 20mVp-p)	◐RV806/VRP-1 (G-4)

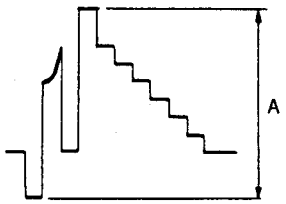
8-2-17. Y PB DEMOD Balance Adjustment

Preparations for adjustment	Specifications	Adjustment
• Play back the color bar signal portion of the alignment tape CR5-2A. • Connect TP801/VRP-1 (G-5) and GND with shorting clip. Oscilloscope • After adjustment, remove the shorting clip.	TP803/VRP-1 (H-2)  A; Minimize (A≦50mVp-p)	◐RV801/VRP-1 (H-5)

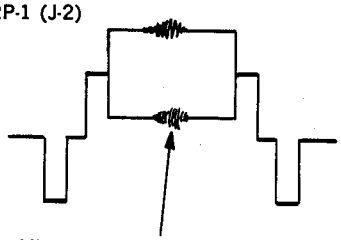
8-2-18. Y DEMOD Gain Adjustment (Metal)

Preparations for adjustment	Specifications	Adjustment
• Play back the color bar signal portion of the alignment tape CR5-1B. Oscilloscope	TP803/VRP-1 (H-2)  A=500±5mVp-p	◐RV804/VRP-1 (H-4)

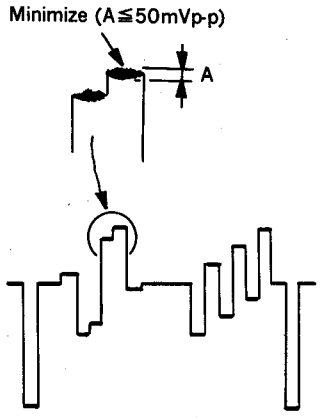
8-2-19. Y DEMOD Gain Adjustment (Oxide)

Preparations for adjustment	Specifications	Adjustment
• Play back the color bar signal portion of the alignment tape CR5-2A. Oscilloscope	TP803/VRP-1 (H-2)  A=500±5mVp-p	◐RV805/VRP-1 (H-4)

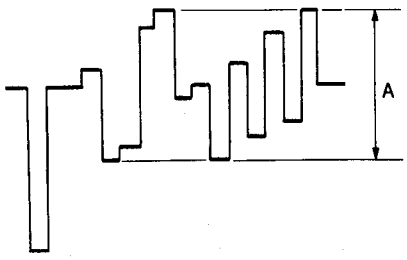
8-2-20. C EE DEMOD Balance Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 60% H sweep • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Signal generator (TSG-300) Oscilloscope	TP903/VRP-1 (J-2)  Minimize moire in 1MHz portion. (less than 20mVp-p)	◐RV906/VRP-1 (J-4)

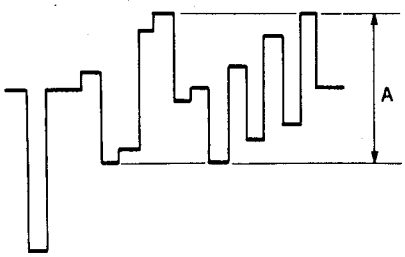
8-2-21. C PB DEMOD Balance Adjustment

Preparations for adjustment	Specifications	Adjustment
• Play back the color bar signal portion of the alignment tape CR5-2A. • Connect TP901/VRP-1 (J-5) and GND with shorting clip. Oscilloscope • After aadjustment, remove the shorting clip.	TP903/VRP-1 (J-2) A; Minimize (A≦50mVp-p) 	◐RV901/VRP-1 (J-5)

8-2-22. C DEMOD Gain Adjustment (Metal)

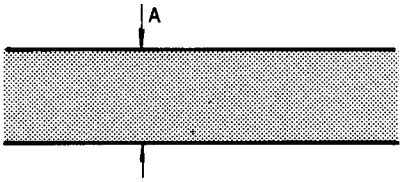
Preparations for adjustment	Specifications	Adjustment
• Play back the color bar signal portion of the alignment tape CR5-1B. Oscilloscope	TP903/VRP-1 (J-2)  A=350±5mVp-p	◐RV904/VRP-1 (K-4)

8-2-23. C DEMOD Gain Adjustment (Oxide)

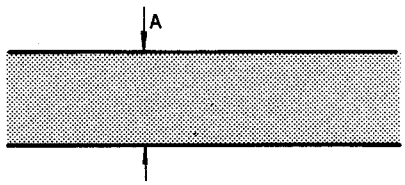
Preparations for adjustment	Specifications	Adjustment
• Play back the color bar signal portion of the alignment tape CR5-2A. Oscilloscope	TP903/VRP-1 (J-2)  A=350±5mVp-p	◐RV905/VRP-1 (K-4)

8-3. TBC SYSTEM

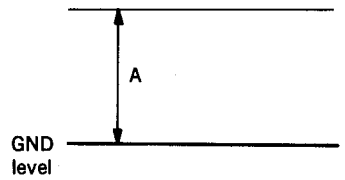
8-3-1. Y VCO Free Run Adjustment

Preparations for adjustment	Specifications	Adjustments
• CAMERA/IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE • S601/TBC-19 (F-9); OFF • S801/TBC-19 (C-9); ON	STEP1. CH-1; TP305/TBC-19 (E-2) CH-2; TP603/TBC-19 (F-8)  Minimize the amplitude A.	◐RV606/TBC-19 (E-1) =SYNC PHASE VR/Left side panel
	STEP2. TEST POINTS; The same as for the STEP1. A: Maximum amplitude B: Minimum amplitude $\frac{A-B}{A} \leqq 0.5$ If the SPEC. is not satisfied, repeat from the STEP1.	◐RV308/TBC-19 (E-2)
Signal generator (TSG-300) Oscilloscope mode....ADD TRIG....LINE		

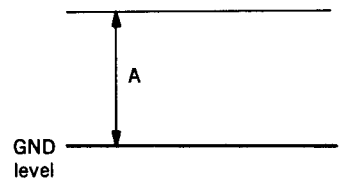
8-3-2. C VCO Free Run Adjustment

Preparations for adjustment	Specifications	Adjustments
• CAMERA/IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE • S601/TBC-19 (F-9); OFF • S801/TBC-19 (C-9); ON	STEP1. CH-1; TP405/TBC-19 (E-4) CH-2; TP603/TBC-19 (F-8)  Minimize the amplitude A.	◐RV606/TBC-19 (E-1) =SYNC PHASE VR/Left side panel
	STEP2. TEST POINTS; The same as for the STEP1. A: Maximum amplitude B: Minimum amplitude $\frac{A-B}{A} \leqq 0.5$ If the SPEC. is not satisfied, repeat from the STEP1.	◐RV406/TBC-19 (D-4)
Signal generator (TSG-300) Oscilloscope mode....ADD TRIG....LINE		

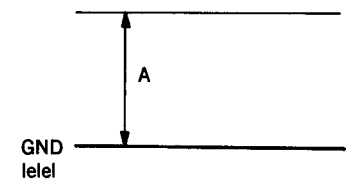
8-3-3. Y Video Phase Tentative Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Oscilloscope	TP306/TBC-19 (D-1)  A=2.3±0.2Vdc	◐RV302/TBC-19 (D-1)

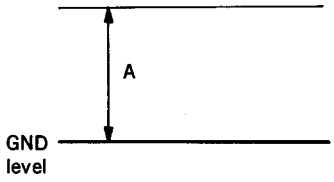
8-3-4. C Video Phase Tentative Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Oscilloscope	TP403/TBC-19 (C-3)  A=2.3±0.2Vdc	◐ RV403/TBC-19 (C-3)

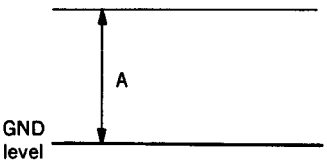
8-3-5. Y VCO Lock In Range Adjustment

Preparations for adjustment	Specifications	Adjustments
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Oscilloscope	TP302/TBC-19 (D-1)  A=2.3±0.1Vdc	◐RV301/TBC-19 (E-1) Adjust the following LV, in case the SPEC. is not met even with the minimum A adjusted by the RV301/TBC-19. ◐LV301/TBC-19 (E-1)

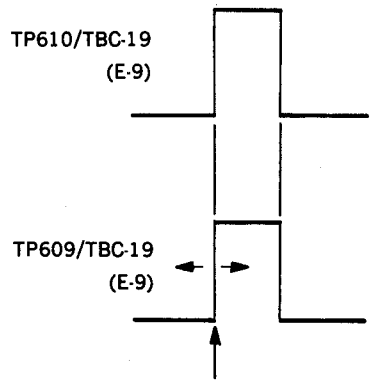
8-3-6. C VCO Lock In Range Adjustment

Preparations for adjustment	Specifications	Adjustments
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Oscilloscope	TP402/TBC-19 (E-3)  A=2.3±0.1Vdc	◐RV404/TBC-19 (E-3/4) Adjust the following LV, in case the SPEC. is not met even with the minimum A adjusted by the RV404/TBC-19. ◐LV401/TBC-19 (E-3)

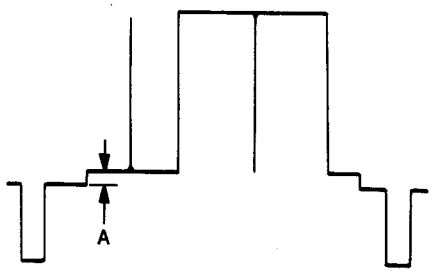
8-3-7. Fast VCO Tracking Adjustment

Preparations for adjustment	Specifications	Adjustment
STEP1. • MODE SW; PB • Play back the color bar signal portion of the alignment tape CR5-2A. • FF mode • REW mode Oscilloscope	TP307/TBC-19 (D-1)  In FF mode: A=3.0 to 4.0Vdc In REW mode: A=1.0 to 2.0Vdc	◐RV309/TBC-19 (E-1) Adjust the RV so that the SPECS. in both FF and REW modes are satisfied.
STEP2. • MODE SW; PB • Play back the color bar signal portion of the alignment tape CR5-2A. • FF mode • REW mode Video monitor	VIDEO OUT 1 A black and white picture appears on the video monitor in both FF and REW modes.	(CHECK) Check the picture only after the tape has speeded up sufficiently, for instance at the middle of the tape.

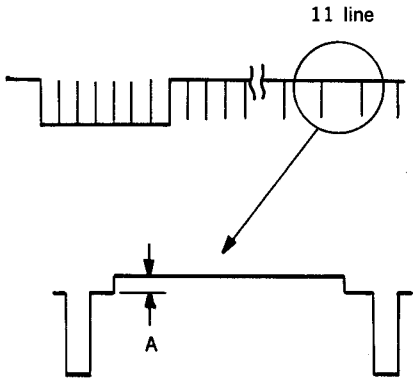
8-3-8. SCH Tentative Adjustment

Preparations for adjustment	Specifications	Adjustment
• VIDEO IN; 75% color bars • CAMERA/LINE SW; LINE • MODE SW; PB/EE Signal generator (TSG-170A) Oscilloscope	CH-1; TP609/TBC-19 (E-9) CH-2; TP610/TBC-19 (E-9)  Make the rising edges coincide (±50ns)	◐RV605/TBC-19 (F-9)

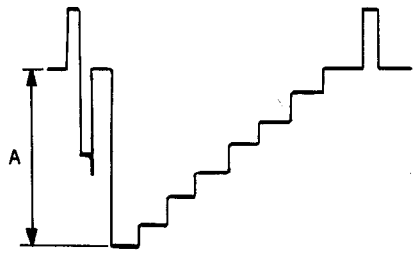
8-3-9. Y A/D Clamp DC Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; Pulse & bar • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE • EE mode Signal generator (TSG-300) Oscilloscope	TP805/TBC-19 (A-9)  Minimize the difference A in level A≦10mV	◐RV101/TBC-19 (B-2)

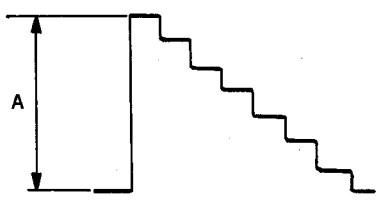
8-3-10. Y 11 Line Blanking DC Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Signal generator (TSG-300) Oscilloscope	TP805/TBC-19 (A-9)  Minimize the difference in level A≦10mV	◐RV705/TBC-19 (D-6)

8-3-11. Y A/D Input Level Adjustment

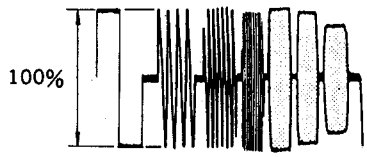
Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Signal generator (TSG-300) Oscilloscope	TP102/TBC-19 (C-1)  A=1.52±0.01V	◐RV102/TBC-19 (B-2)

8-3-12. Y D/A Output Level Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE • PB VIDEO LEVEL VR/Left side panel =RV817/TBC-19 (E-1); center click Signal generator (TSG-300) Oscilloscope	TP701/TBC-19 (D-6)  A=1.00±0.01V	◐RV701/TBC-19 (D-6)

8-3-13. Y PB Frequency Response Adjustment (Metal)

<table>
<tr><th>Preparations for adjustment</th><th>Specifications</th><th>Adjustments</th></tr>
<tr><td>STEP1.
• Connect TP801/VRP-1 (G-5) and GND with shorting clip.
• Play back the multi burst signal portion of the alignment tape CR5-1B.

Waveform/vector scope (1750)
FIELD....1+3</td><td>TP805/VRP-1 (G-2)
0.5 1.0 2.0 3.0 4.1 4.5MHz
 

0.5MHz: 4.1MHz=100%: 100%</td><td>◐RV601/VRP-1 (H-7)</td></tr>
<tr><td>STEP2.
• Same as STEP1 except the following.

Waveform/vector scope (1750)
FIELD....2+4</td><td>Same as STEP1.</td><td>◐RV602/VRP-1 (H-7)</td></tr>
<tr><td>STEP3.
• Same as STEP1 except the following.

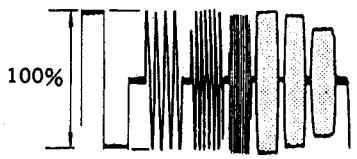
Waveform/vector scope (1750)
FIELD....1+3 and 2+4</td><td>TP805/VRP-1 (G-2)
<table><tr><th>FREQUENCY (MHz)</th><th>LEVEL (%)</th></tr><tr><td>0.5</td><td>100^{+3}_{-7}</td></tr><tr><td>1.0</td><td>100^{+3}_{-7}</td></tr><tr><td>2.0</td><td>100^{+3}_{-10}</td></tr><tr><td>3.0</td><td>100^{+3}_{-10}</td></tr><tr><td>4.5</td><td>90±10</td></tr></table></td><td>(CHECK)</td></tr>
<tr><td>STEP4.
• Same as STEP3.

• After adjustment, remove the shorting clip.</td><td>TP805/VRP-1 (G-2)
Difference between CH-A and CH-B
(level difference in FIELD 1+3 and 2+4)

At 4.1MHz, the level difference is within 5%</td><td>(CHECK)</td></tr>
</table>

8-3-14. Y PB Frequency Response Adjustment (Oxide)

<table>
<tr><th>Preparations for adjustment</th><th>Specifications</th><th>Adjustments</th></tr>
<tr><td>STEP1.
• Connect TP801/VRP-1 (G-5) and GND with shorting clip.
• Play back the multi burst signal portion of the alignment tape CR5-2A.

Waveform/vector scope (1750)
FIELD....1+3</td><td>TP805/VRP-1 (G-2)
0.5 1.0 2.0 3.0 4.1 4.5MHz
 

0.5MHz: 4.1MHz=100%: 90%</td><td>◐ RV603/VRP-1 (H-7)</td></tr>
<tr><td>STEP2.
• Same as STEP1 except the following.

Waveform/vector scope (1750)
FIELD....2+4</td><td>Same as STEP1.</td><td>◐ RV604/VRP-1 (H-7)</td></tr>
<tr><td>STEP3.
• Same as STEP1 except the following.

Waveform/vector scope (1750)
FIELD....1+3 and 2+4</td><td>TP805/VRP-1 (G-2)
<table><tr><th>FREQUENCY (MHz)</th><th>LEVEL (%)</th></tr><tr><td>0.5</td><td>100 $^{+3}_{-7}$</td></tr><tr><td>1.0</td><td>100 $^{+3}_{-7}$</td></tr><tr><td>2.0</td><td>95±10</td></tr><tr><td>4.1</td><td>75±10</td></tr></table></td><td>(CHECK)</td></tr>
<tr><td>STEP4.
• Same as STEP3.

• After adjustment, remove the shorting clip.</td><td>TP805/VRP-1 (G-2)
Difference between CH-A and CH-B
(level difference in FIELD 1+3 and 2+4)

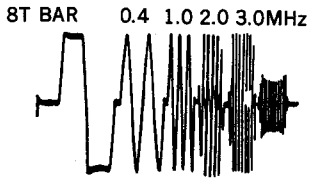
At 3MHz, the level difference is within 5%</td><td>(CHECK)</td></tr>
</table>

8-3-15. Y Over Modulation Compensation Adjustment

Preparations for adjustment	Specifications	Adjustments
STEP1. • Play back the color bar signal portion of the alignment tape CR5-1B. Digital volt meter (dc)	TP801/VRP-1 (G-5) 4.41±0.01Vdc	◐RV802/VRP-1 (H-3)
STEP2. • Play back the color bar signal portion of the alignment tape CR5-2A. Digital volt meter (dc)	TP801/VRP-1 (G-5) 4.41±0.01Vdc	◐RV803/VRP-1 (H-3)

8-3-16. C PB Frequency Response Adjustment (Metal)

<table>
<tr><th>Preparations for adjustment</th><th>Specifications</th><th>Adjustments</th></tr>
<tr><td>STEP1.
• Connect TP901/VRP-1 (J-5) and GND with shorting clip.
• Play back the multi burst signal portion of the alignment tape CR5-1B.

Waveform/vector scope (1750)
FIELD....1+3</td><td>TP905/VRP-1 (J-2)
 

8T BAR: 3MHz=100%: 95%</td><td>◐ RV701/VRP-1 (K-7)</td></tr>
<tr><td>STEP2.
• Same as STEP1 except the following.

Waveform/vector scope (1750)
FIELD....2+4</td><td>Same as STEP1.</td><td>◐ RV702/VRP-1 (K-7)</td></tr>
<tr><td>STEP3.
• Same as STEP1 except the following.

Waveform/vector scope (1750)
FIELD....1+3 and 2+4</td><td>TP905/VRP-1 (J-2)
<table><tr><th>FREQUENCY (MHz)</th><th>LEVEL (%)</th></tr><tr><td>0.4</td><td>100±5</td></tr><tr><td>1.0</td><td>100±5</td></tr><tr><td>3.0</td><td>90±10</td></tr></table></td><td>(CHECK)</td></tr>
<tr><td>STEP4.
• Same as STEP3.

• After adjustment, remove the shorting clip.</td><td>TP905/VRP-1 (J-2)
Difference between CH-A and CH-B

At 3MHz, the level difference is within 5%</td><td>(CHECK)</td></tr>
</table>

8-3-17. C PB Frequency Response Adjustment (Oxide)

<table>
<tr><th>Preparations for adjustment</th><th>Specifications</th><th>Adjustments</th></tr>
<tr><td>STEP1.
• Connect TP901/VRP-1 (J-5) and GND with shorting clip.
• Play back the multi burst signal portion of the alignment tape CR5-2A.

Waveform/vector scope (1750)
FIELD....1+3</td><td>TP905/VRP-1 (J-2)

8T BAR 0.4 1.0 2.0 3.0MHz

8T BAR: 3MHz=100%: 100%</td><td>◐ RV703/VRP-1 (J-7)</td></tr>
<tr><td>STEP2.
• Same as STEP1 except the following.

Waveform/vector scope (1750)
FIELD....2+4</td><td>Same as STEP1.</td><td>◐ RV704/VRP-1 (K-7)</td></tr>
<tr><td>STEP3.
• Same as STEP1 except the following.

Waveform/vector scope (1750)
FIELD....1+3 and 2+4</td><td>TP905/VRP-1 (J-2)

<table><tr><th>FREQUENCY (MHz)</th><th>LEVEL (%)</th></tr><tr><td>0.4</td><td>100±5</td></tr><tr><td>1.0</td><td>100±5</td></tr><tr><td>3.0</td><td>80±10</td></tr></table></td><td>(CHECK)</td></tr>
<tr><td>STEP4.
• Same as STEP3.

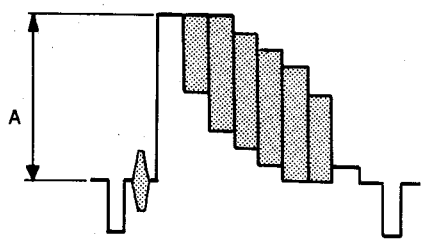
• After adjustment, remove the shorting clip.</td><td>TP905/VRP-1 (J-2)
Difference between CH-A and CH-B

At 3MHz, the level difference is within 5%</td><td>(CHECK)</td></tr>
</table>

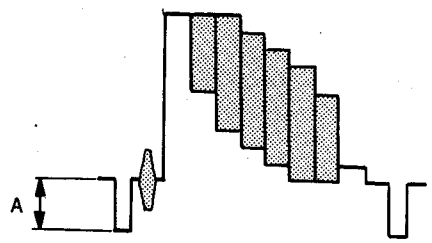
8-3-18. C Over Modulation Compensation Adjustment

Preparations for adjustment	Specifications	Adjustments
STEP1. • Play back the color bar signal portion of the alignment tape CR5-1B. Digital volt meter (dc)	TP901/VRP-1 (J-5) 4.20±0.01Vdc	◐RV902/VRP-1 (H-3)
STEP2. • Play back the color bar signal portion of the alignment tape CR5-2A. Digital volt meter (dc)	TP901/VRP-1 (J-5) 4.20±0.01Vdc	◐RV903/VRP-1 (H-3)

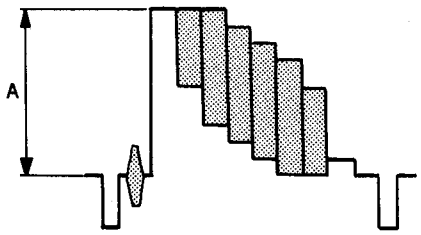
8-3-19. VIDEO OUT 1 Level Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Signal generator (TSG-300) Waveform/vector scope (1750)	VIDEO OUT 1 (terminated with 75Ω)  A=100±0.7 IRE	◐RV5/VRP-1 (B-7)

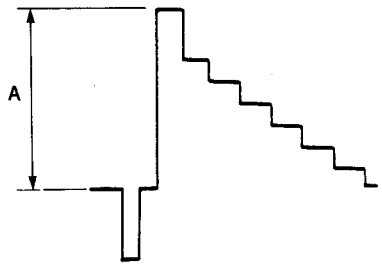
8-3-20. Encode Video Sync Mix Level Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Signal generator (TSG-300) Waveform/vector scope (1750)	VIDEO OUT 1 (terminated with 75Ω)  A=40±0.7 IRE	◐RV818/TBC-19 (B-9)

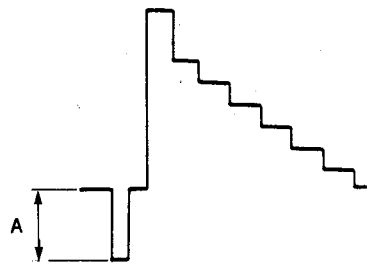
8-3-21. VIDEO OUT 2 Level Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Signal generator (TSG-300) Waveform monitor (1750)	VIDEO OUT 2 (terminated with 75Ω)  A=100±0.7 IRE	◐RV7/VRP-1 (A-7)

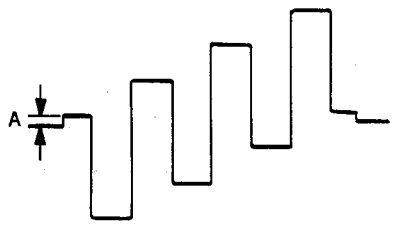
8-3-22. Component DUB Y Output Level Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Signal generator (TSG-300) Waveform monitor (1750)	Y/DUB/COMPONENT OUT (terminated with 75Ω)  A=100±0.7 IRE	◐RV8/VRP-1 (A-8)

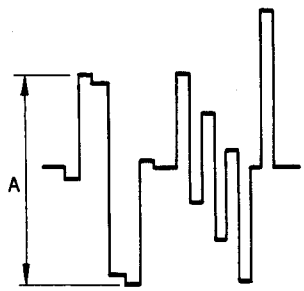
8-3-23. TBC Y Sync Mix Level Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Signal generator (TSG-300) Waveform/vector scope (1750)	Y/DUB/COMPONENT OUT (terminated with 75Ω)  A=40±0.7 IRE	◐RV816/TBC-19 (B-9)

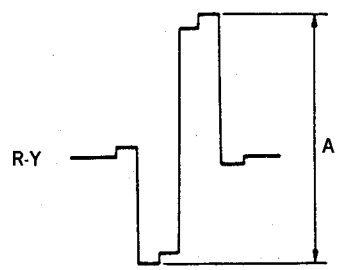
8-3-24. C A/D Clamp DC Tentative Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Signal generator (TSG-300) Oscilloscope	TP802/TBC-19 (B-6)  Minimize the difference A in level. A≦20mV	◐RV201/TBC-19 (B-3)

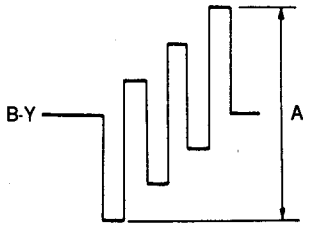
8-3-25. C A/D Input Level Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Signal generator (TSG-300) Oscilloscope	TP202/TBC-19 (C-2)  A=1.25±0.02 V	◐RV202/TBC-19 (B-3)

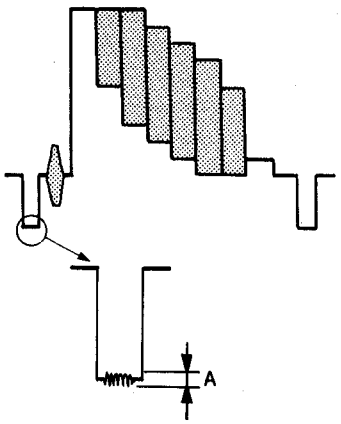
8-3-26. C D/A Output Level Adjustment (R-Y)

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Signal generator (TSG-300) Oscilloscope	TP803/TBC-19 (B-7)  A=0.80±0.02 V	◐RV703/TBC-19 (D-8)

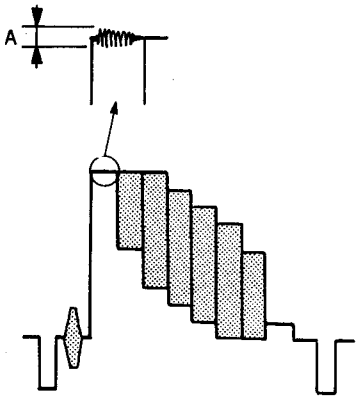
8-3-27. C D/A Output Level Adjustment (B-Y)

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Signal generator (TSG-300) Oscilloscope	TP802/TBC-19 (B-6)  A=0.80±0.02 V	◐RV702/TBC-19 (D-7)

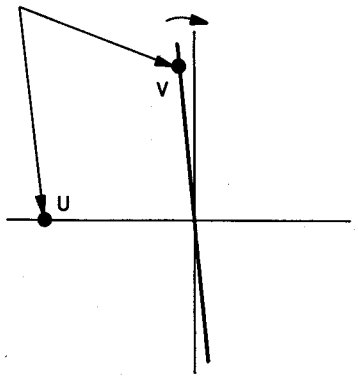
8-3-28. Encoder Carrier Balance Adjustment

Preparations for adjustment	Specifications	Adjustments
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Signal generator (TSG-300) Waveform monitor	VIDEO OUT 1 (terminated with 75Ω) Carrier leak of SYNC portion A≦0.5 IRE  	◐RV806/TBC-19 (B-6) ◐RV807/TBC-19 (B-7)

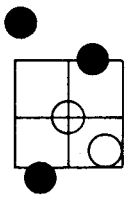
8-3-29. C A/D Clamp DC Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Signal generator (TSG-300) Waveform monitor	VIDEO OUT 1 (terminated with 75Ω) Carrier leak of WHITE portion A≦1.0 IRE 	◐RV201/TBC-19 (B-3)

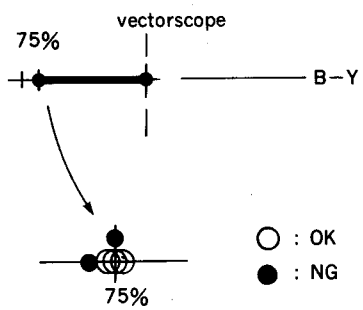
8-3-30. U/V Axis Adjustment

Preparations for adjustment	Specifications	Adjustments
• CAMERA IN; QUAD PHASE • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE	VIDEO OUT 1 (terminated with 75Ω) (1) Make the U axis coincide with the horizontal line of the vectorscope.	◐ PHASE ADJ/vectorscope
	(2) Position the bright spots on the U/V axis respectively. 	◐ RV813/TBC-19 (E-7)
Signal generator (TSG-300) Vectorscope GAIN....75% ϕREF....BURST MODE....CHA, Aϕ LINE SELECT....15	(3) The V axis coincides with the vertical line of the vectorscope	(CHECK)

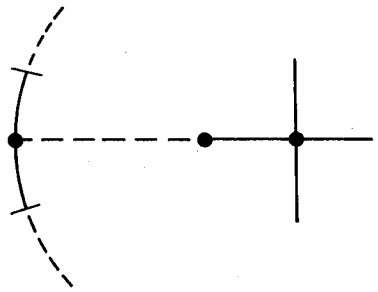
8-3-31. C Level Adjustment

Preparations for adjustment	Specifications	Adjustments
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Signal generator (TSG-300) Vectorscope GAIN....PRESET ϕREF....BURST MODE....CHA, Aϕ LINE SELECT....15	VIDEO OUT 1 (terminated with 75Ω)  ○ : OK ● : NG 4 luminescent spots (R, C_Y, Y_L, B) shall be inside the respective "⊞" mark on the vectorscope.	"R" "C_Y" luminescent spots: ◐RV815/TBC-19 (B-8) "Y_L", "B" luminescent spots: ◐RV808/TBC-19 (B-6)

8-3-32. Burst Mix Level Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Signal generator (TSG-300) Vectorscope GAIN....PRESET ϕREF....BURST MODE....CHA, Aϕ LINE SELECT....15	VIDEO OUT 1 (terminated with 75Ω)  The luminescent spot of burst shall be at 75% position on the B-Y axis.	◐RV804/TBC-19 (B-7)

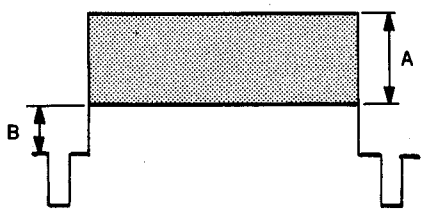
8-3-33. VIDEO OUT SCH Adjustment

Preparations for adjustment	Specifications	Adjustment
• VIDEO IN; 75 color bars • CAMERA/LINE SW; LINE • MODE SW; PB/EE Signal generator (TSG-170A) Waveform/vector scope (1750) RESPONSE....IRE INPUT....A VOLT FULL SCALE....1.0 MAG....(10μs) DISPLAY....10μs LINE SELECTOR....OFF FIELD....1+3 SYNC....INT	VIDEO OUT 1 (terminated with 75Ω)  $-2° \leqq SCH \leqq +2°$	◐ RV605/TBC-19 (F-9)

8-3-34. Internal SC Frequency Adjustment

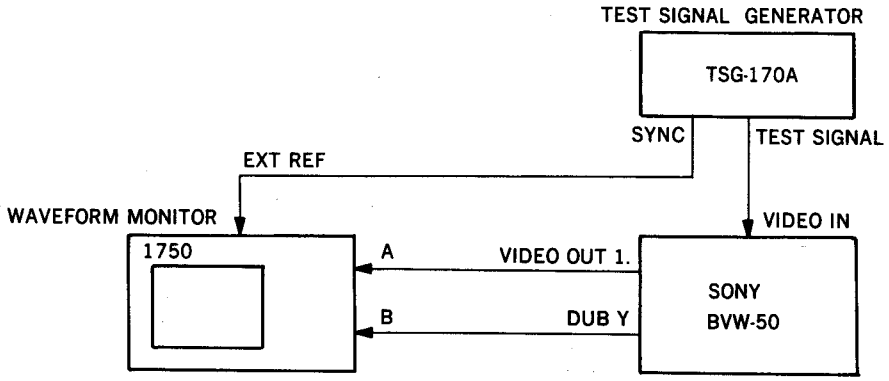
Preparations for adjustment	Specifications	Adjustment
• All inputs of VTR; OFF • Play back the color bar signal portion of the alignment tape CR5-1B. Frequency counter	TP603/TBC-19 (F-8) 14,318,180±4 Hz	◐ RV601/TBC-19 (E-8)

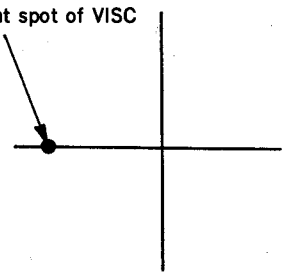
8-3-35. VISC Adjustment (Level/Offset)

Preparations for adjustment	Specifications	Adjustments
• VIDEO IN; 75% color bars • CAMERA/LINE SW; LINE • MODE SW; PB/EE • COLOR FRAME SW; ON Signal generator (TSG-170A) Waveform monitor RESPONSE....IRE LINE SELECT....11	Y/DUB/COMPONENT OUT (terminated with 75Ω)  SPEC1; LEVEL, A=0.286±0.01Vp-p SPEC2; OFFSET, B=0.053±0.01V	SPEC1: ◐ RV801/TBC-19 (B-9) SPEC2: ◐ RV805/TBC-19 (D-9)

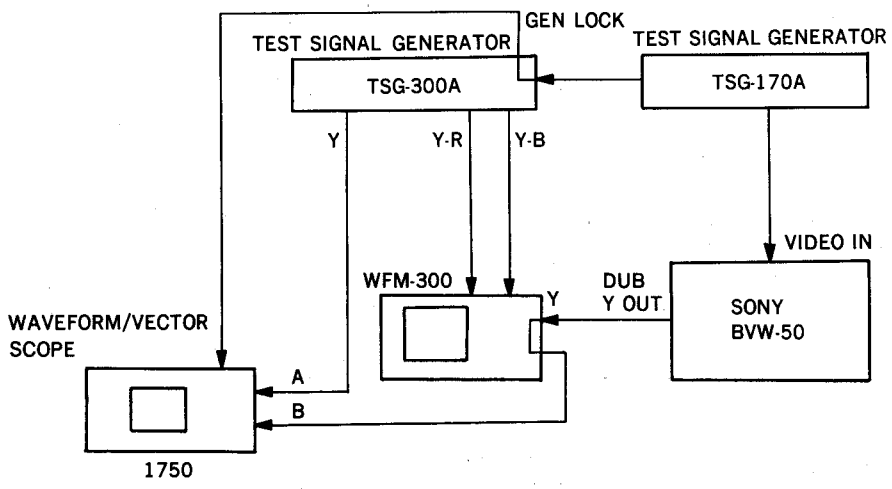
8-3-36. VISC Phase Adjustment

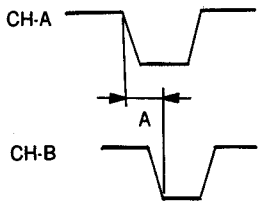
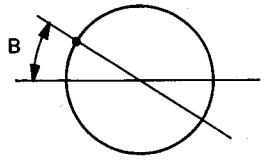
[CONNECTION]



Preparations for adjustment	Specifications	Adjustments
STEP1. • VIDEO IN; 75% color bars • CAMERA/LINE SW; LINE • MODE SW; PB/EE • COLOR FRAME SW; ON Signal generator (TSG-170A) Waveform/vector montior (1750) MODE....SCH INPUT....A	(1) VIDEO OUT 1 (terminated with 75Ω) SCH=0°	◐ PHASE VR/WAVEFORM/ VECTOR MONITOR
STEP2. • Same as STEP1 except the following. Waveform/vector montior (1750) MODE....SCH INPUT....B	Y/DUB/COMPONENT OUT (terminated with 75Ω) SYNC=0°	◐ SYNC PHASE VR/Left side panel =RV606/TBC-19 (E-1)
STEP3. • Same as STEP2 except the following. Waveform/vector monitor MODE....vector LINE....19	Y/DUB/COMPONENT OUT (terminated with 75Ω) luminescent spot of VISC  PHASE; 0±2°	◐ RV803/TBC-19 (D-9)

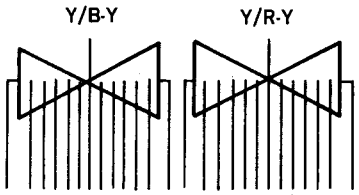
8-3-37. PB Video Phase Adjustment



Preparations for adjustment	Specifications	Adjustments
STEP1. • VIDEO IN; 75% color bars • CAMERA/LINE SW; LINE • MODE SW; PB/EE • COLOR FRAME SW; OFF • Play back the 50% BOWTIE & 12.5T signal portion of the alignment tape CR5-1B. Signal generator (TSG-170A) Signal generator (TSG-300) TEST SIGNAL.... BOWTIE & 12.5T Waveform/vector scope INPUT....CH-A/B	WAVEFORM/VECTOR SCOPE (1750) CH-A; Y/TSG-300 CH-B; Y/DUB/COMPONENT OUT (terminated with 75Ω)  A=0±0.1μs Make the CH-B SYNC phase coincide with the CH-A.	◐ SYNC PHASE VR (Left Plate) =RV606/TBC-19 (E-1)
STEP2. • Same as STEP1 except the following. Waveform/vector scope INPUT....CH-A MODE....SCH	Y/TSG-300 WAVEFORM/VECTOR SCOPE (1750)  B=0° (Set SCH to zero degree)	◐ PHASE VR/WAVEFORM/ VECTOR SCOPE

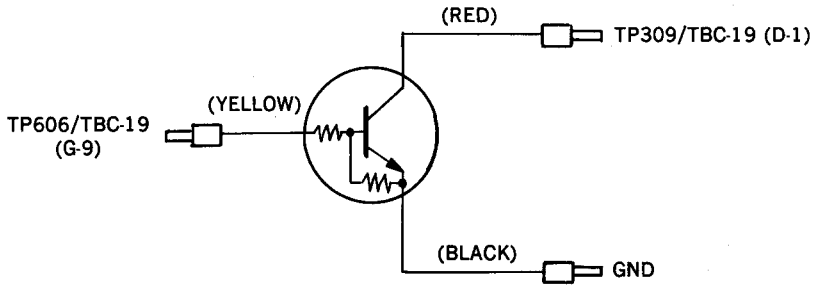
Continues to the next page.

8-3-37. PB Video Phase Adjustment (Continued)

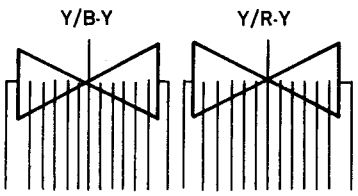
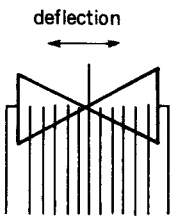
Preparations for adjustment	Specifications	Adjustments
STEP3. • Same as STEP2 except the following. Waveform/vector scope INPUT....CH-B	Y/DUB/COMPONENT OUT (terminated with 75Ω) OTHER; Same as STEP2.	◐SYNC PHASE VR (Left side panel) =RV606/TBC-19 (E-1)
STEP4. • Same as STEP3 except the following. Waveform monitor (WFM-300) MODE....BOWTIE	Y/DUB/COMPONENT OUT (terminated with 75Ω) WAVEFORM MONITOR WFM-300  (Marker; 20 ns/div) Y/B-Y delay≦10ns	◐RV307/TBC-19 (C-2)

8-3-38. PB Y/B-Y Delay Adjustment

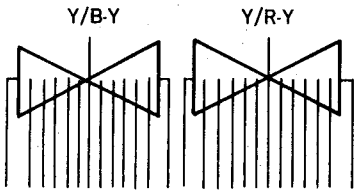
Prepare the following Video Phase adjustment tool.



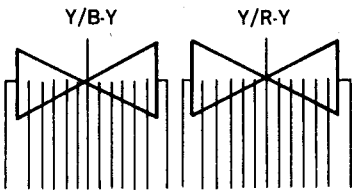
DTC144EK or equivalent

Preparations for adjustment	Specifications	Adjustments
STEP1. • Play back the BOWTIE & 12.5T signal portion of the alignment tape CR5-1B. Waveform monitor (WFM-300) MODE....BOWTIE	Y/DUB/COMPONENT OUT (terminated with 75Ω) B-Y/DUB/COMPONENT OUT (terminated with 75Ω)  (Marker; 20 ns/div) Y/B-Y delay≦10ns	◐ RV405/TBC-19 (C-3)
STEP2. • Connect the Video Phase adjustment tool. • OTHER; Same as STEP1.	 Y/B-Y (Marker; 20 ns/div) Deflection of Y/B-Y delay 0≦10ns	◐ RV401/TBC-19 (C-3)
STEP3. • Same as STEP1. • After adjustment, remove the Video Phase Adjustment tool.	Repeat the STEP1.	Same as STEP1.

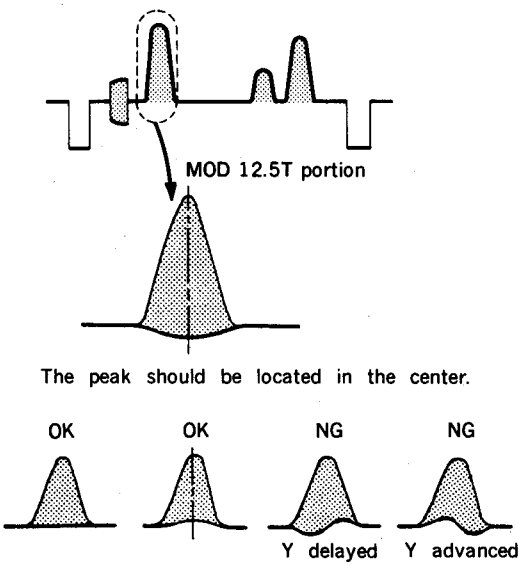
8-3-39. DUB OUT Y/R-Y Delay Adjustment

Preparations for adjustment	Specifications	Adjustment
• Play back the BOWTIE & 12.5T signal portion of the alignment tape CR5-1B. Waveform monitor (WFM-300) MODE....BOWTIE	Y/DUB/COMPONENT OUT (terminated with 75Ω) R-Y/DUB/COMPONENT OUT (terminated with 75Ω)  (Marker; 20 ns/div) Y/R-Y delay≦10ns	◐ RV706/TBC-19 (C-8)

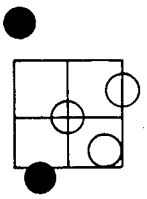
8-3-40. PB Y/C Delay Metal/Oxide Offset Adjustment

Preparations for adjustment	Specifications	Adjustment
• Play back the BOWTIE & 12.5T signal portion of the alignment tape CR5-2A. Waveform monitor (WFM-300) MODE....BOWTIE	Y/DUB/COMPONENT OUT (terminated with 75Ω) R-Y/DUB/COMPONENT OUT (terminated with 75Ω) B-Y/DUB/COMPONENT OUT (terminated with 75Ω)  (Marker; 20 ns/div) (1) Y/B-Y delay≦10ns (2) Y/R-Y delay≦10ns	◐ RV409/TBC-19 (C-4)

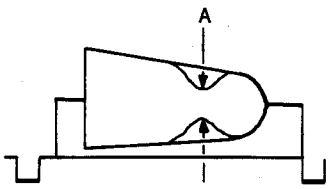
8-3-41. Y/C Delay Adjustment

Preparations for adjustment	Specifications	Adjustment
STEP1. • Play back the BOWTIE & 12.5T signal portion of the alignment tape CR5-1B. Waveform/vector scope (1750)	VIDEO OUT 1 (terminated with 75Ω)  Y/C delay≦10ns	◐RV814/TBC-19 (B-8)
STEP2. • Same as STEP1, except the following. Waveform/vector scope FIELD....1+3/2+4 switching	VIDEO OUT 1 (terminated with 75Ω) FIELD 1+3; Y/C delay≦10ns FIELD 2+4; Y/C delay≦10ns	(CHECK)
STEP3. • Play back the BOWTIE & 12.5T signal portion of the alignment tape CR5-2A. • Repeat the procedures described in STEP1 and STEP2.	FIELD 1+3; Y/C delay≦20ns FIELD 2+4; Y/C delay≦20ns	(CHECK)

8-3-42. Vector Level Fine Tuning Adjustment

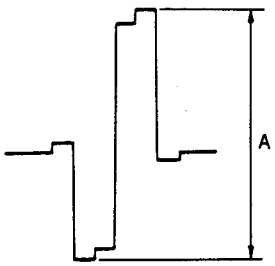
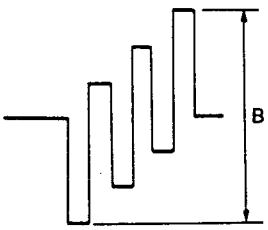
Preparations for adjustment	Specifications	Adjustments
STEP1. • CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE • Play back the 75% color bar signal portion of the alignment tape CR5-2A. Signal generator Vectorscope	VIDEO OUT 1 (terminated with 75Ω)  ○ : OK ● : NG At least half spot size of all six luminescent spots shall be inside the respective ⊞ mark on the vectorscope.	◐RV815/TBC-19 (B-8)
STEP2. • Play back the 75% color bar signal portion of the alignment tape CR5-1B. • OTHERS; Same as STEP1.		(CHECK)
STEP3. • Same as STEP2, except the following. Waveform monitor	VIDEO OUT 1 (terminated with 75Ω) BURST LEVEL; 40±1IRE (0.286±0.007Vp-p)	◐RV804/TBC-19 (B-7) Fine Tuning Adjust

8-3-43. VISC Lock Phase Adjustment

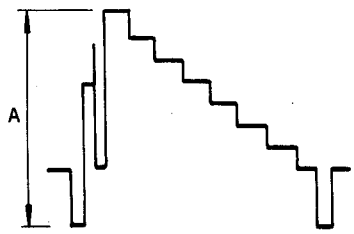
Preparations for adjustment	Specifications	Adjustments
• VIDEO IN; V sweep (REDUCE) • CAMERA/LINE SW; LINE • COLOR FRAME SW; ON • MODE SW; PB/EE	VIDEO OUT 1 (terminated with 75Ω) SPEC1. Maximize A. 	SPEC. 1. ◐RV802/TBC-19 (D-9)
	SPEC2. FREQUENCY (MHz) / LEVEL (%) 0.5 / 100 (REF) 3.0 / 100^{+5}_{-25} 4.0 / 100^{+5}_{-25}	SPEC. 2 (CHECK)
Signal generator (1410) Waveform monitor		

8-4. VRP OUTPUT SYSTEM

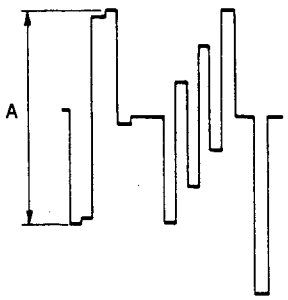
8-4-1. R-Y/B-Y Output Level Adjustment

Preparations for adjustment	Specifications	Adjustments
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE Signal generator Oscilloscope	R-Y/DUB/COMPONENT OUT (terminated with 75Ω) B-Y/DUB/COMPONENT OUT (terminated with 75Ω) (1) R-Y  A=0.70±0.01Vp-p (2) B-Y  B=0.70±0.01Vp-p	(1) R-Y: ◐RV9/VRP-1 (B-8) (2) B-Y: ◐RV10/VRP-1 (B-7)

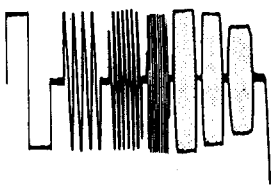
8-4-2. CTDM DUB Y Output Level Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE • Connect 11pin of DUB/COMPONENT OUT connector and GND with a shorting clip. Signal generator Oscilloscope • After adjustment remove the shorting clip.	Y/DUB/COMPONENT OUT (terminated with 75Ω)  A=1.00±0.01Vp-p	◐RV807/VRP-1 (H-1)

8-4-3. DUB CTDM Output Level Adjustment

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 75% color bars • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE • Connect 11pin of DUB/COMPONENT OUT connector and GND with a shorting clip. Signal generator Oscilloscope • After adjustment, remove the shorting clip.	CTDM/DUB COMPONENT OUT (terminated with 75Ω)  A=0.70±0.01Vp-p	◐RV907/VRP-1 (K-1)

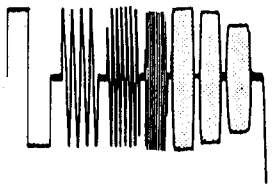
8-4-4. Y PB Frequency Response Check (Metal)

Preparations for adjustment	Specifications	Adjustments
• Connect TP801/VRP-1 (G-5) and GND with a shorting clip. • Play back the multi burst signal portion of the alignment tape CR5-1B. Waveform monitor FIELD....1+3/2+4 • After adjustment, remove the shorting clip.	Y/DUB/COMPONENT OUT (terminated with 75Ω) 0.5 1.0 2.0 4.1 3.0 4.5MHz  Level at 0.5MHz; 0 dB REF SPEC1. (FIELD 1+3, 2+4) SPEC2. Difference between CH-A and CH-B (level difference in FIELD 1+3 and 2+4) At 4.1MHz, level difference shall be within 5%	SPEC1. • When the specification is not satisfied with FIELD 1+3. ◐RV601/VRP-1 (H-7) Fine Tuning Adjust • When the specification is not satisfied with FIELD 2+4. ◐RV602/VRP-1 (H-7) Fine Tuning Adjust SPEC2. (CHECK)

FREQUENCY (MHz)	LEVEL (dB)
0.5	REF (0dB)
1.0	$0\ ^{+0.3}_{-0.7}$
2.0	$0\ ^{+0.3}_{-0.7}$
3.0	$0\ ^{+0.3}_{-0.7}$
4.1	$0\ ^{+0.3}_{-1.2}$
4.5	$-1.0\ ^{+1.0}_{-1.5}$

8-4-5. Y PB Frequency Response Check (Oxide)

<table>
<tr><th>Preparations for adjustment</th><th>Specifications</th><th>Adjustments</th></tr>
<tr>
<td>
• Connect TP801/VRP-1 (G-5) and GND with a shorting clip.
• Play back the multi burst signal portion of the alignment tape CR5-2A.

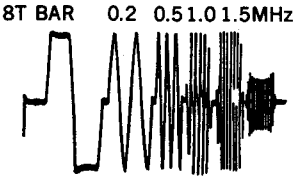
Waveform monitor
FIELD....1+3/2+4
• After adjustment, remove the shorting clip.
</td>
<td>
Y/DUB/COMPONENT OUT (terminated with 75Ω)
0.5 1.0 2.0 4.1
3.0 4.5MHz

Level at 0.5MHz; 0dB REF
SPEC1. (FIELD 1+3, 2+4)
<table>
<tr><th>FREQUENCY (MHz)</th><th>LEVEL (dB)</th></tr>
<tr><td>0.5</td><td>REF (0dB)</td></tr>
<tr><td>1.0</td><td>$0\ ^{+0.3}_{-0.7}$</td></tr>
<tr><td>2.0</td><td>$0\ ^{+0.3}_{-1.0}$</td></tr>
<tr><td>3.0</td><td>−1.0±1.0</td></tr>
<tr><td>4.1</td><td>−3.5±1.5</td></tr>
</table>
SPEC2.
Difference between CH-A and CH-B
(level difference in FIELD 1+3 and 2+4)

At 3.0MHz, level difference shall be within 5%
</td>
<td>
SPEC1.
• When the specification is not satisfied with FIELD 1+3.
◐RV603/VRP-1 (H-7)
Fine Tuning Adjust
• When the specification is not satisfied with FIELD 2+4.
◐RV604/VRP-1 (H-7)
Fine Tuning Adjust
SPEC2.
(CHECK)
</td>
</tr>
</table>

8-4-6. C PB Frequency Response Check (Metal)

<table>
<tr><th>Preparations for adjustment</th><th>Specifications</th><th>Adjustments</th></tr>
<tr>
<td>
• Connect TP901/VRP-1 (J-5) and GND with a shorting clip.
• Play back the multi burst signal portion of the alignment tape CR5-1B.

Waveform monitor
FIELD....1+3/2+4
• After adjustment, remove the shorting clip.
</td>
<td>
R-Y/DUB/COMPONENT OUT (terminated with 75Ω)
B-Y/DUB/COMPONENT OUT (terminated with 75Ω)



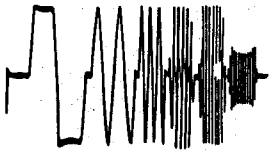
Level of 8T BAR; 0dB REF
SPEC1. (FIELD 1+3, 2+4)
<table>
<tr><th>FREQUENCY (MHz)</th><th>LEVEL (dB)</th></tr>
<tr><td>0.2</td><td>$0\ ^{+0.3}_{-0.7}$</td></tr>
<tr><td>0.5</td><td>$0\ ^{+0.3}_{-0.7}$</td></tr>
<tr><td>1.0</td><td>$0\ ^{+0.3}_{-1.0}$</td></tr>
<tr><td>1.5</td><td>−1.5±1.5</td></tr>
</table>
SPEC2.
Difference between CH-A and CH-B
(level difference in FIELD 1+3 and 2+4)

At 1.5MHz, level difference shall be within 5%
</td>
<td>
SPEC1.
• When the specification is not satisfied with FIELD 1+3.
◐RV701/VRP-1 (K-7)
Fine Tuning Adjust
• When the specification is not satisfied with FIELD 2+4.
◐RV702/VRP-1 (K-7)
Fine Tuning Adjust
SPEC2.
(CHECK)
</td>
</tr>
</table>

8-4-7. C PB Frequency Response Check (Oxide)

<table>
<tr><th>Preparations for adjustment</th><th>Specifications</th><th>Adjustments</th></tr>
<tr>
<td>
• Connect TP901/VRP-1 (J-5) and GND with a shorting clip.
• Play back the multi burst signal portion of the alignment tape CR5-2A.

Waveform monitor
FIELD....1+3/2+4
• After adjustment, remove the shorting clips.
</td>
<td>
R-Y/DUB/COMPONENT OUT (terminated with 75Ω)
B-Y/DUB/COMPONENT OUT (terminated with 75Ω)

8T BAR 0.2 0.5 1.0 1.5MHz


Level of 8T BAR; 0dB REF
SPEC1. (FIELD 1+3, 2+4)
<table>
<tr><th>FREQUENCY (MHz)</th><th>LEVEL (dB)</th></tr>
<tr><td>0.2</td><td>$0\ ^{+0.3}_{-0.7}$</td></tr>
<tr><td>0.5</td><td>$0\ ^{+0.3}_{-0.7}$</td></tr>
<tr><td>1.0</td><td>−1.0±1.0</td></tr>
<tr><td>1.5</td><td>−1.5±1.5</td></tr>
</table>
SPEC2.
Difference between CH-A and CH-B
(level difference in FIELD 1+3 and 2+4)

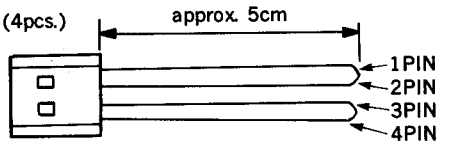
At 1.5MHz, level difference shall be within 5%
</td>
<td>
SPEC1.
• When the specification is not satisfied with FIELD 1+3.
◐RV703/VRP-1 (K-7)
Fine Tuning Adjust
• When the specification is not satisfied with FIELD 2+4.
◐RV704/VRP-1 (K-7)
Fine Tuning Adjust
SPEC2.
(CHECK)
</td>
</tr>
</table>

8-5. VRP REC AMP SYSTEM

8-5-1. Y REC Current Frequency Response Adjustment (Metal)

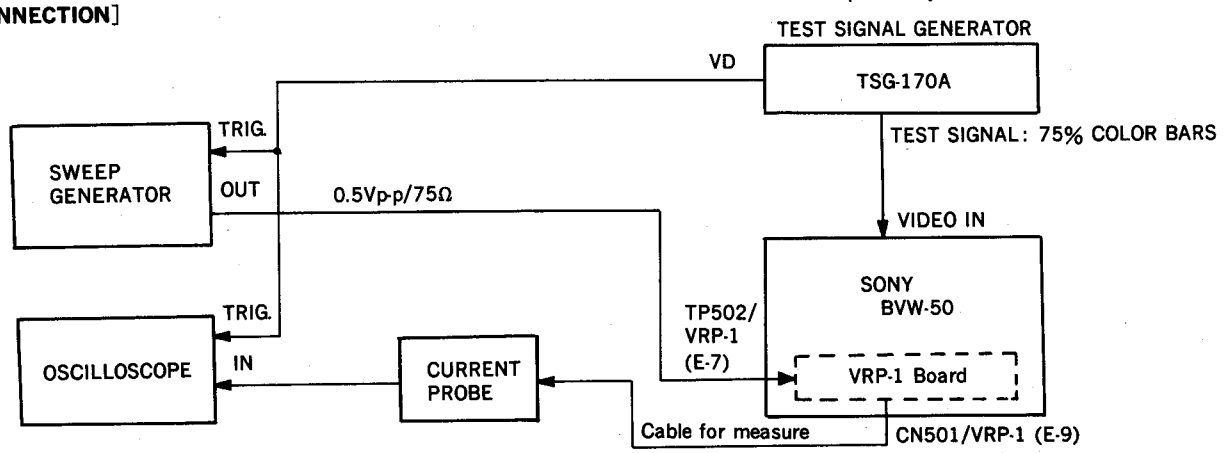
*Prepare the following cable for measure.

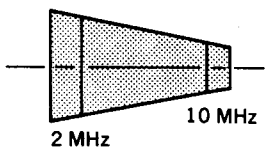
HOUSING, 4P P/N 1-562-149-11 (1pc.)
CONTACT, FEMALE P/N 1-564-026-21 (4pcs.)



Connect between 1pin and 2pin by a wire.
Clip it on by means of a current probe in use.
Connect between 3pin and 4pin by a wire.
Clip it on by means of a current probe in use.

[CONNECTION]



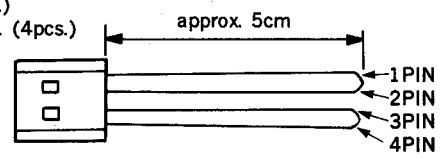
Preparations for adjustment	Specifications	Adjustments
• VIDEO IN; 75% color bars • CAMERA/LINE SW; LINE • Connect TP501/VRP-1 (E-7) and E301/VRP-1 (F-6) with shorting clip. • Connect the output of SWEEP GENERATOR to between TP502/VRP-1 (E-7) and GND. The load of 75 ohms are taken by R502 on VRP-1. • Remove COP501 and COP502*/ VRP-1 (E-8) • Connect between 1pin and 2pin (or 3pin and 4pin) of CN501/ VRP-1 (E-9) by means of the cable for measure. Clip it on by means of the current probe. • Insert a BCT-20M blank tape. • REC mode • After adjustment, remount COP501 and COP502. Remove the shorting clip and the cable for measure.	CH-A; CN501-1, 2pin/VRP-1 CH-B; CN501-3, 4pin/VRP-1  FREQUENCY (MHz) / LEVEL (%) 2.0 / 100 (REF) 10.0 / 60±10	CH-A: ◐RV531/VRP-1 (F-8) CH-B: ◐RV532/VRP-1 (E-8)

*COP501 and COP502 are the short plugs inserted in COR501 and COR502.

8-5-2. Y REC Current Frequency Response Adjustment (Oxide)

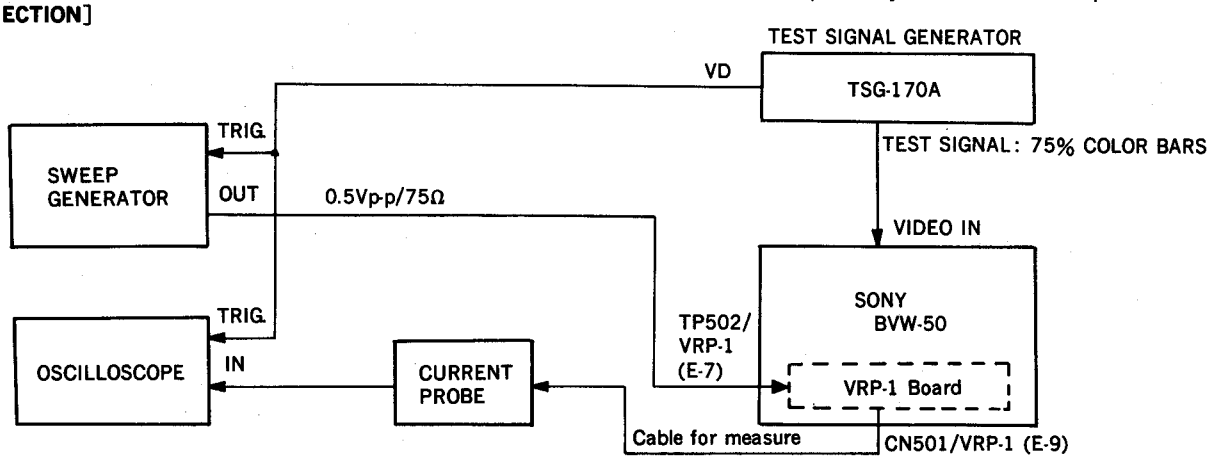
* Prepare the following cable for measure.

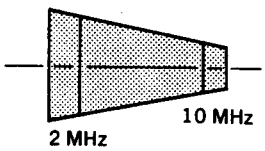
HOUSING, 4P P/N 1-562-149-11 (1pc.)
CONTACT, FEMALE P/N 1-564-026-21 (4pcs.)



Connect between 1pin and 2pin by a wire.
Clip it on by means of a current probe in use.
Connect between 3pin and 4pin by a wire.
Clip it on by means of a current probe in use.

[CONNECTION]



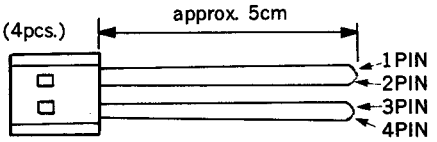
Preparations for adjustment	Specifications	Adjustments
• VIDEO IN; 75% color bars • CAMERA/LINE SW; LINE • Connect TP501/VRP-1 (E-7) and E301/VRP-1 (F-6) with shorting clip. • Connect the output of SWEEP GENERATOR to between TP502/VRP-1 (E-7) and GND. The load of 75 ohms are taken by R502 on VRP-1. • Remove COP501 and COP502*/ VRP-1 (E-8) • Connect between 1pin and 2pin (or 3pin and 4pin) of CN501/ VRP-1 (E-9) by means of the cable for measure. Clip it in by means of the current probe. • Insert a BCT-20G blank tape. • REC mode • After adjustment, remount COP501 and COP502. Remove the shorting clip and the cable for measure.	CH-A; CN501-1, 2pin/VRP-1 CH-B; CN501-3, 4pin/VRP-1  FREQUENCY (MHz) / LEVEL (%) 2.0 / 100 (REF) 10.0 / 55±10	CH-A: RV541/VRP-1 (F-8) CH-B: RV542/VRP-1 (E-8)

* COP501 and COP502 are the short plugs inserted in COR501 and COR502.

8-5-3. C REC Current Frequency Response Adjustment (Metal)

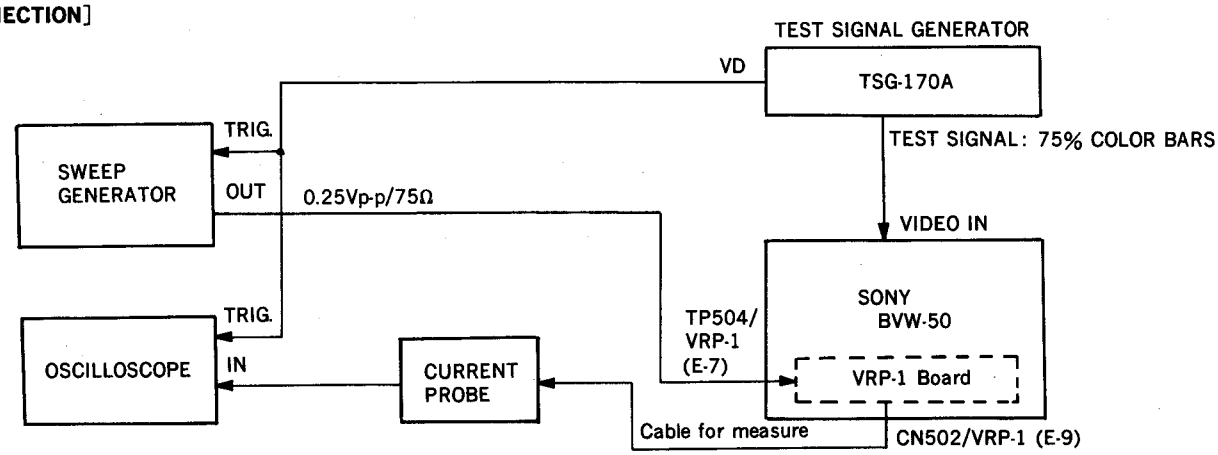
* Prepare the following cable for measure.

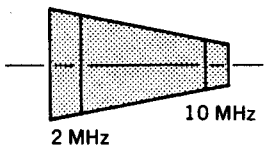
HOUSING, 4P P/N 1-562-149-11 (1pc.)
CONTACT, FEMALE P/N 1-564-026-21 (4pcs.)



Connect between 1pin and 2pin by a wire.
Clip it on by means of a current probe in use.
Connect between 3pin and 4pin by a wire.
Clip it on by means of a current probe in use.

[CONNECTION]



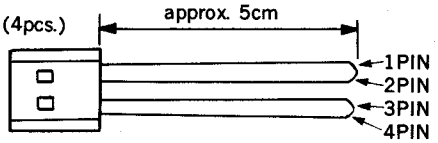
Preparations for adjustment	Specifications	Adjustments
• VIDEO IN; 75% color bars • CAMERA/LINE SW; LINE • Connect TP503/VRP-1 (E-7) and E301/VRP-1 (F-6) with shorting clip. • Connect the output of SWEEP GENERATOR to between TP504/VRP-1 (E-7) and GND. The load of 75 ohms are taken by R529 on VRP-1. • Remove COP503 and COP504*/ VRP-1 (E-8) • Connect between 1pin and 2pin (or 3pin and 4pin) of CN502/ VRP-1 (E-9) by means of the cable for measure. Clip it on by means of the current probe. • Insert a BCT-20M blank tape. • REC mode • After adjustment, remount COP503 and COP504. Remove the shorting clip and the cable for measure.	CH-A; CN502-1, 2pin/VRP-1 CH-B; CN502-3, 4pin/VRP-1  FREQUENCY (MHz) / LEVEL (%) 2.0 / 100 (REF) 10.0 / 60±10	CH-A: RV533/VRP-1 (E-8) CH-B: RV534/VRP-1 (D-8)

* COP503 and COP504 are the short plugs inserted in COR503 and COR504.

8-5-4. C REC Current Frequency Response Adjustment (Oxide)

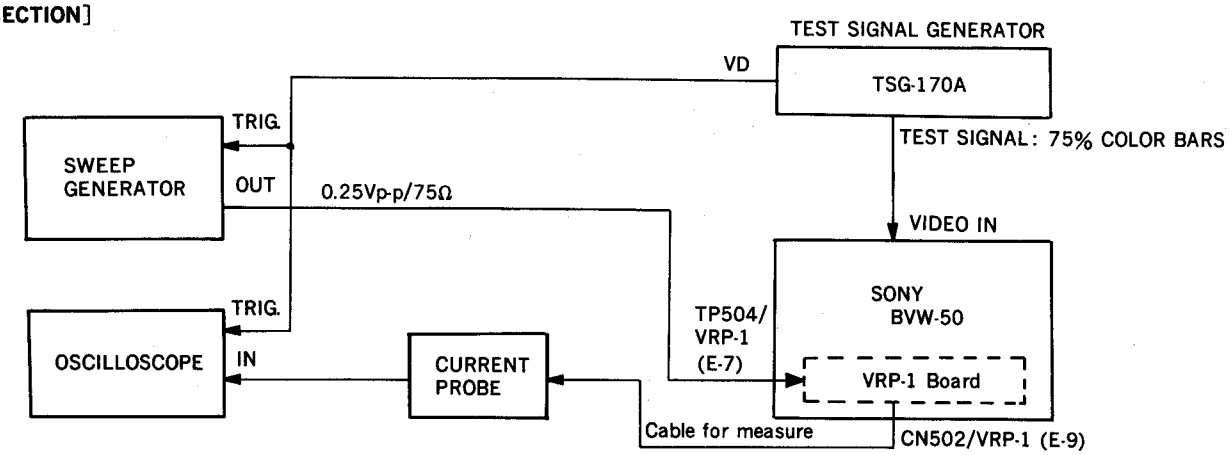
* Prepare the cable for measure. (Same as 8-5-1)

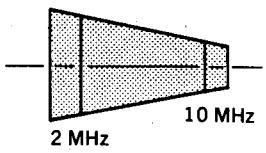
HOUSING, 4P P/N 1-562-149-11 (1pc.)
CONTACT, FEMALE P/N 1-564-026-21 (4pcs.)



Connect between 1pin and 2pin by a wire.
Clip it on by means of a current probe in use.
Connect between 3pin and 4pin by a wire.
Clip it on by means of a current probe in use.

[CONNECTION]



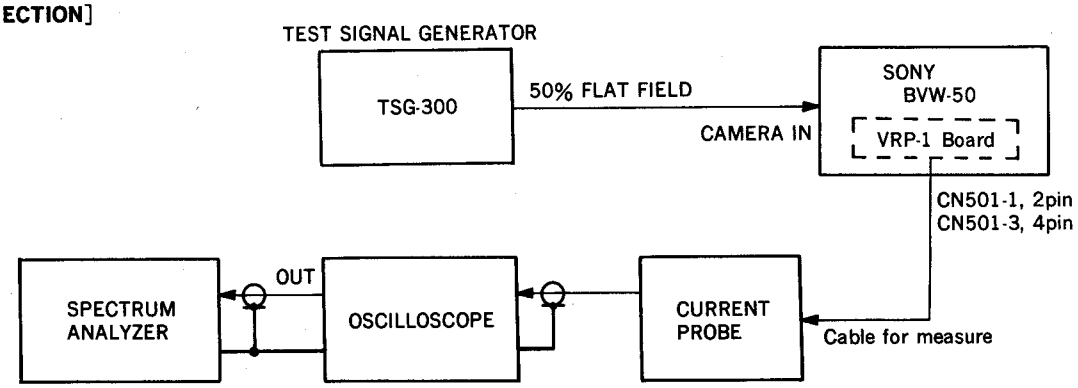
Preparations for adjustment	Specifications	Adjustments
• VIDEO IN; 75% color bars • CAMERA/LINE SW; LINE • Connect TP503/VRP-1 (E-7) and E301/VRP-1 (F-6) with shorting clip. • Connect the output of SWEEP GENERATOR to between TP504/VRP-1 (E-7) and GND. The load of 75 ohms are taken by R529 on VRP-1. • Remove COP503 and COP504*/ VRP-1 (E-8) • Connect between 1pin and 2pin (or 3pin and 4pin) of CN502/ VRP-1 (E-9) by means of the cable for measure. Clip it on by means of the current probe. • Insert a BCT-20G blank tape. • REC mode • After adjustment, remount COP503 and COP504. Remove the shorting clip and the cable for measure.	CH-A; CN502-1, 2pin/VRP-1 CH-B; CN502-3, 4pin/VRP-1  FREQUENCY (MHz) / LEVEL (%) 2.0 / 100 (REF) 10.0 / 50±10%	CH-A: ◐RV543/VRP-1 (D-8) CH-B: ◐RV544/VRP-1 (D-8)

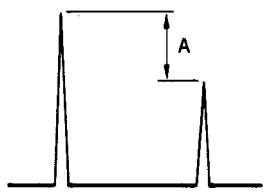
* COP503 and COP504 are the short plugs inserted in COR503 and COR504.

8-5-5. Y REC Amp Secondary Distortion Adjustment

* Prepare the cable for measure. (Same as 8-5-1)

[CONNECTION]



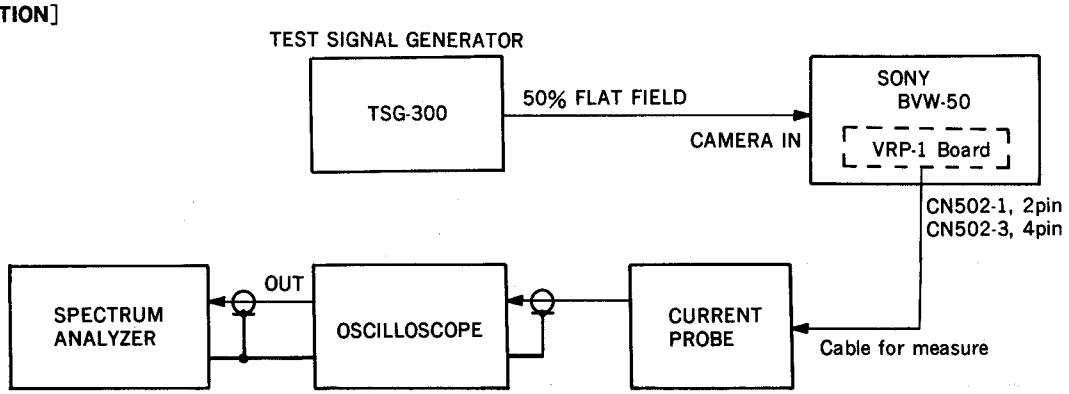
Preparations for adjustment	Specifications	Adjustments
STEP1. • CAMERA IN; 50% flat field • CAMERA/LINE SW; CAMERA • Remove COP501 and COP502/ VRP-1 (E-8) • Connect between 1pin and 2pin (or 3pin and 4pin) of CN501/ VRP-1 (E-9) by means of the cable for measure. Clip it on by means of the current probe. • Insert a BCT-20M blank tape. • REC mode	CH-A; CN501-1, 2pin/VRP-1 (E-9) CH-B; CN501-3, 4pin/VRP-1 (E-9) SPECTRUM ANALYZER Minimize the second higher harmonic level  Fundamental (6MHz) Second higher harmonic (12MHz) A≦−40dB	CH-A: ◐RV501/VRP-1 (F-7) CH-B: ◐RV502/VRP-1 (E-7)
STEP2. • Insert a BCT-20G blank tape. • OTHERS; Same as STEP1. • After adjustment, remount COP501 and COP502. Remove the shorting clip and the cable for measure.	CH-A; CN501-1, 2/VRP-1 (E-9) CH-B; CN501-3, 4/VRP-1 (E-9) A≦−35dB	(CHECK)

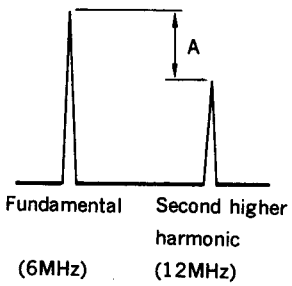
* COP501 and COP502 are the short plugs inserted in COR501 and COR502.

8-5-6. C REC Amp Secondary Distortion Adjustment

* Prepare the cable for measure. (Same as 8-5-1)

[CONNECTION]



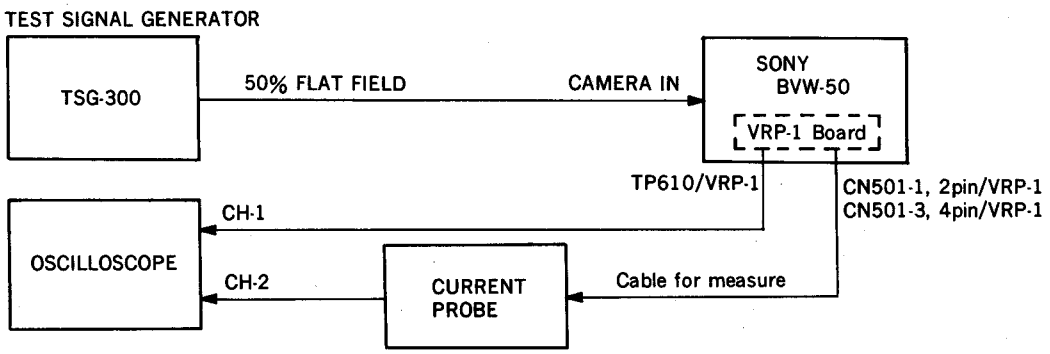
Preparations for adjustment	Specifications	Adjustments
STEP1. • CAMERA IN; 50% flat field • CAMERA/LINE SW; CAMERA • Remove COP503 and COP504/ VRP-1 (E-8) • Connect between 1pin and 2pin (or 3pin and 4pin) of CN502/ VRP-1 (E-9) by means of the cable for measure. Clip it on by means of the current probe. • Insert a BCT-20M blank tape. • REC mode	CH-A; CN502-1, 2pin/VRP-1 (E-9) CH-B; CN502-3, 4pin/VRP-1 (E-9) SPECTRUM ANALYZER Minimize the second higher harmonic level  Fundamental (6MHz) Second higher harmonic (12MHz) A≦−40dB	CH-A: RV503/VRP-1 (D-7) CH-B: RV504/VRP-1 (D-7)
STEP2. • Insert a BCT-20G blank tape. • OTHERS; Same as STEP1. • After adjustment, remount COP503 and COP504. Remove the shorting clip and the cable for measure.	CH-A; CN502-1, 2/VRP-1 (E-9) CH-B; CN502-3, 4/VRP-1 (E-9) A≦−35dB	(CHECK)

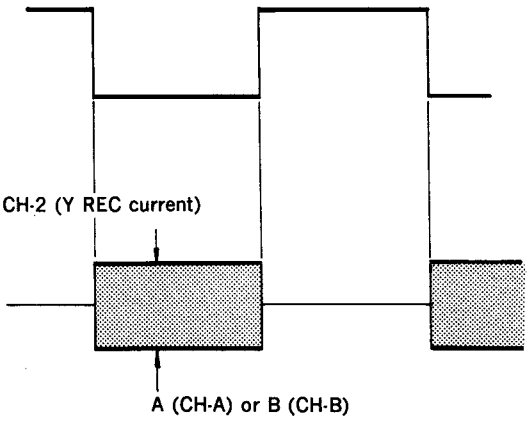
* COP503 and COP504 are the short plugs inserted in COR503 and COR504.

8-5-7. Y REC Current Adjustment (Metal)

* Prepare the cable for measure. (Same as 8-5-1)

[CONNECTION]

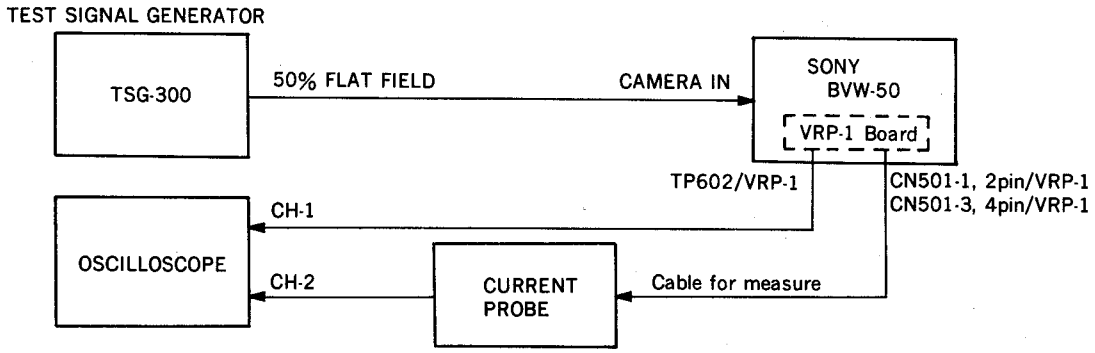


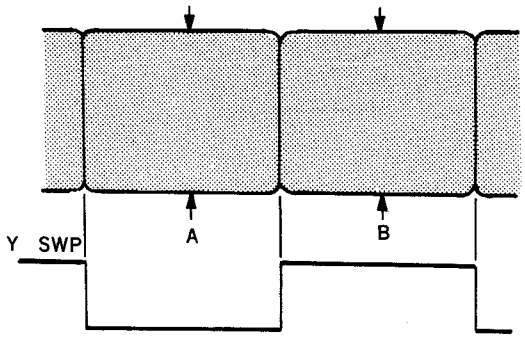
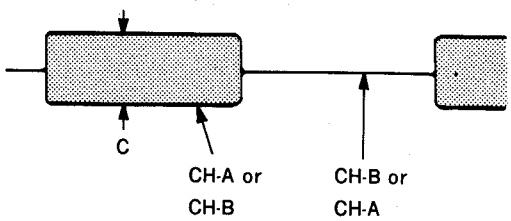
Preparations for adjustment	Specifications	Adjustments
• CAMERA IN; 50% flat field • CAMERA/LINE SW; CAMERA • Remove COP501 and COP502/ VRP-1 (E-8) • Connect between 1pin and 2pin (or 3pin and 4pin) of CN501/ VRP-1 (E-9) by means of the cable for measure. Clip it on by means of the current probe. • Insert a BCT-20M blank tape. • REC mode • After adjustment, remount COP501 and COP502. Remove the shorting clip and the cable for measure.	CH-A; CN501-1, 2pin/VRP-1 CH-B; CN501-3, 4pin/VRP-1 CH-1 (Y SWP)  CH-2 (Y REC current) A (CH-A) or B (CH-B) A=60±2mA B=60±2mA	CH-A: ◐RV511/VRP-1 (F-7) CH-B: ◐RV512/VRP-1 (E-7)

8-5-8. Y REC Current Adjustment (Oxide)

*Prepare the cable for measure. (Same as 8-5-1)

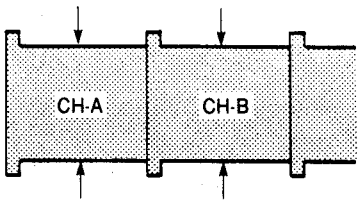
[CONNECTION]



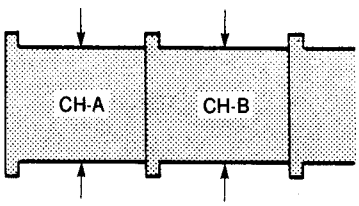
Preparations for adjustment	Specifications	Adjustments
• CAMERA IN; 50% flat field • CAMERA/LINE SW; CAMERA • Remove COP501 and COP502/VRP-1 (E-8) • Connect between 1pin and 2pin (or 3pin and 4pin) of CN501/VRP-1 (E-9) by means of the cable for measure. Clip it on by means of the current probe. • Insert a BCT-20G blank tape. • REC mode	STEP1. TP602/VRP-1 (H-8) Maximize the RF level (A and B).  	CH-A: ◐RV521/VRP-1 (F-7) CH-B: ◐RV522/VRP-1 (E-7)
• After adjustment, remount COP501 and COP502. Remove the shorting clip and the cable for measure.	STEP2. CH-A; CN501-1, 2pin/VRP-1 CH-B; CN501-3, 4pin/VRP-1  C=35±10mA	Readjust the RVs so that (measured Y REC current +5) mA meet the specification C. CH-A: ◐RV521/VRP-1 (F-7) CH-B: ◐RV522/VRP-1 (E-7)

8-5-9. Overall Y RF Level/Balance Check

Step1. (Metal)

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 50% flat field • Perform the self-recording/play back with BCT-20M blank tape. Signal generator Oscilloscope TRIG....TP610/VRP-1 (H-9)	TP602/VRP-1 (H-8) TRACKING VR; Maximize the RF level.  SPEC1. CH-A≒CH-B=400±150mV SPEC2. The voltage difference between CH-A and CH-B should be within 100mV.	◐TRACKING VR/Left side panel • When the specification is not satisfied, perform section 8-5-7 within the specification allowance.

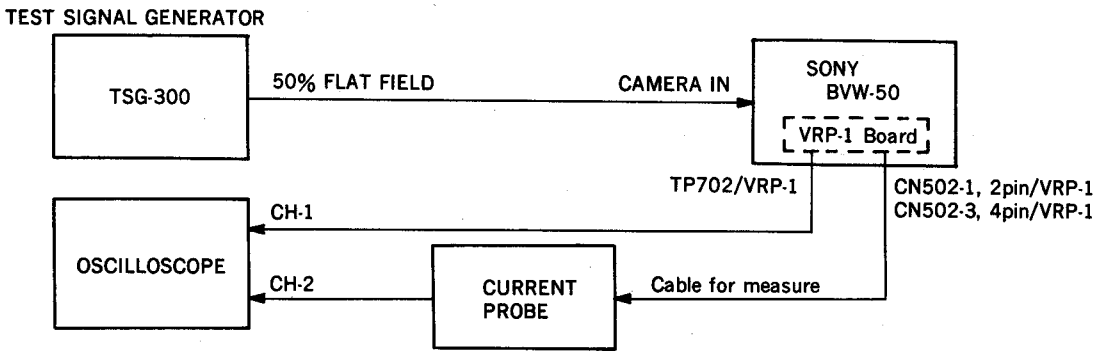
Step2. (Oxide)

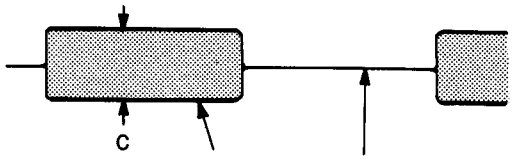
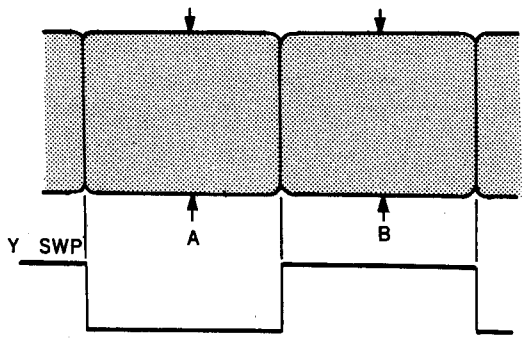
Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 50% flat field • Perform the self-recording/play back with BCT-20G blank tape. Signal generator Oscilloscope TRIG....TP610/VRP-1 (H-9)	TP602/VRP-1 (H-8) TRACKING VR; Maximize the RF level.  SPEC1. CH-A≒CH-B=200±100mV SPEC2. The voltage difference between CH-A and CH-B should be within 100mV.	◐TRACKING VR/Left side panel • When the specification is not satisfied, perform section 8-5-8 within the specification allowance.

8-5-10. C REC Current Adjustment (Metal)

* Prepare the cable for measure. (Same as 8-5-1)

[CONNECTION]

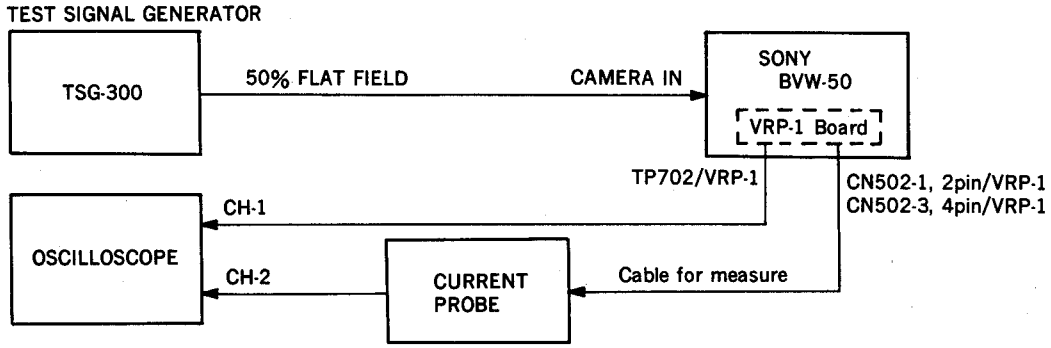


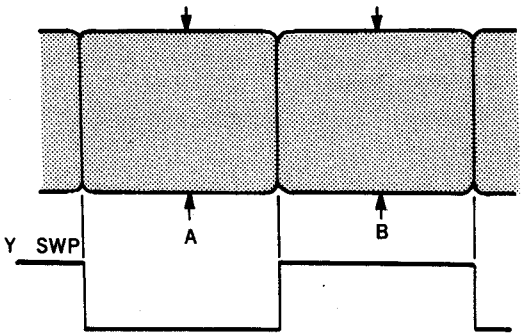
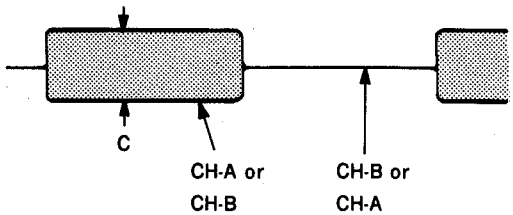
Preparations for adjustment	Specifications	Adjustments
• CAMERA IN; 50% flat field • CAMERA/LINE SW; CAMERA • Remove COP503 and COP504/ VRP-1 (E-8) • Connect between 1pin and 2pin (or 3pin and 4pin) of CN502/ VRP-1 (E-9) by means of the cable for measure. Clip it on by means of the current probe. • Insert a BCT-20M blank tape. • REC mode • After adjustment, remount COP503 and COP504. Remove the cable for measure.	CH-A; CN502-1, 2pin/VRP-1 CH-B; CN502-3, 4pin/VRP-1  C=55±2mA (reference) TP702/VRP-1 (J-6)  	CH-A: ◐RV513/VRP-1 (D-7) CH-B: ◐RV514/VRP-1 (D-7)

8-5-11. C REC Current Adjustment (Oxide)

* Prepare the cable for measure. (Same as 8-5-1)

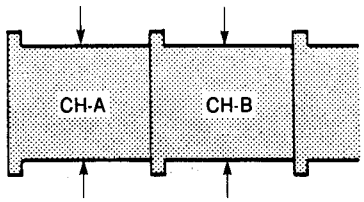
[CONNECTION]



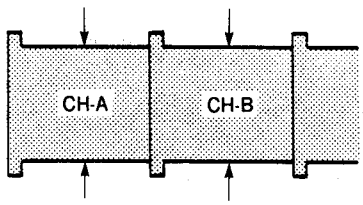
Preparations for adjustment	Specifications	Adjustments
• CAMERA IN; 50% flat field • CAMERA/LINE SW; CAMERA • Remove COP503 and COP504/ VRP-1 (E-8) • Connect between 1pin and 2pin (or 3pin and 4pin) of CN502/ VRP-1 (E-9) by means of the cable for measure. Clip it on by means of the current probe. • Insert a BCT-20G blank tape. • REC mode	SPEC1. TP702/VRP-1 (K-6) Maximize the RF level (A and B).  	CH-A: ◐RV523/VRP-1 (D-7) CH-B: ◐RV524/VRP-1 (D-7)
• After adjustment, remount COP503 and COP504. Remove the cable for measure.	SPEC2. CH-A; CN502-1, 2pin/VRP-1 CH-B; CN502-3, 4pin/VRP-1  C=35±10mA	(CHECK)

8-5-12. Overall C RF Level/Balance Check

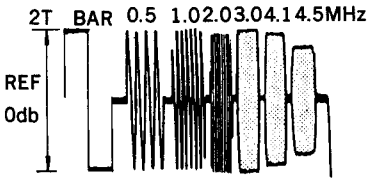
Step1. (Metal)

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 50% flat field • Perform the self-recording/play back with BCT-20M blank tape. Signal generator Oscilloscope TRIG....TP701/VRP-1 (H-9)	TP702/VRP-1 (K-8) TRACKING VR; Maximize the RF level.  SPEC1. CH-A≒CH-B=250±100mV SPEC2. The voltage difference between CH-A and CH-B should be within 50mV.	◐TRACKING VR/Left side panel • When the specification is not satisfied, perform section 8-5-10 within the specification allowance.

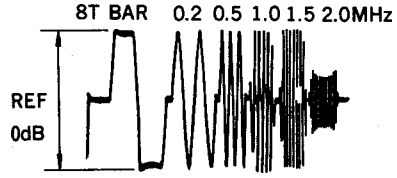
Step2. (Oxide)

Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; 50% flat field • Perform the self-recording/play back with BCT-20G blank tape. Signal generator Oscilloscope TRIG....TP701/VRP-1 (H-9)	TP702/VRP-1 (K-8) TRACKING VR; Maximize the RF level.  SPEC1. CH-A≒CH-B=150±70mV SPEC2. The voltage difference between CH-A and CH-B should be within 50mV.	◐TRACKING VR/Left side panel • When the specification is not satisfied, perform section 8-5-11 within the specification allowance.

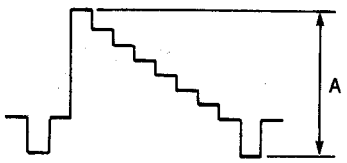
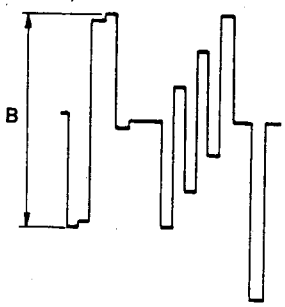
8-5-13. Overall Y Frequency Response Check

Preparations for adjustment	Specifications	Adjustments
• CAMERA IN; MULTI BURST • CAMERA/LINE SW; CAMERA • Perform the self-recording/play back with BCT-20M and BCT-20G blank tape. Signal generator (TSG-300) Waveform monitor (WFM-300)	Y/DUB/COMPONENT OUT (terminated with 75Ω)  • Metal FREQUENCY (MHz) / LEVEL (dB) 0.5 / $0^{+0.3}_{-0.5}$ 1.0 / $0^{+0.3}_{-0.7}$ 2.0 / $0^{+0.3}_{-0.7}$ 3.0 / $0^{+0.3}_{-0.7}$ 4.1 / $0^{+0.3}_{-1.2}$ 4.5 / $-1.0^{+1.0}_{-1.5}$ Difference between CH-A and CH-B: At 4.1MHz, level difference shall be within ±0.4dB • Oxide FREQUENCY (MHz) / LEVEL (dB) 0.5 / $0^{+0.3}_{-0.5}$ 1.0 / $0^{+0.3}_{-0.7}$ 2.0 / $0^{+0.3}_{-1.0}$ 3.0 / −1.0±1.0 4.1 / −3.5±1.5 Difference between CH-A and CH-B: At 4.1MHz, level difference shall be within ±0.4dB.	(CHECK) • When the specification is not satisfied, perform section 8-5-1 and 8-5-2 readjustment. • When high-range level is higher in Overall Frequency Response. ↓ Raise current frequency response. • When high-range level is lower in Overall Frequency Response. ↓ Lower current frequency response.

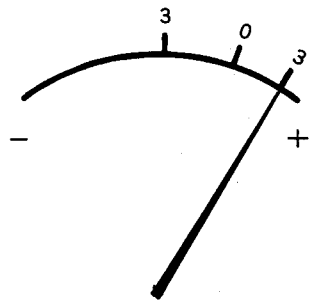
8-5-14. Overall C Frequency Response Check

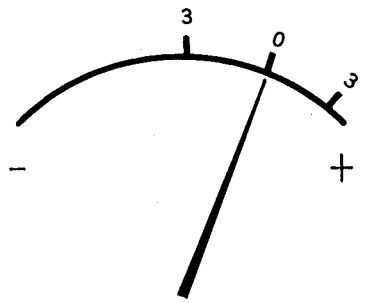
Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; MULTI BURST • CAMERA/LINE SW; CAMERA • Perform the self-recording/play back with BCT-20M and BCT-20G blank tape. Signal generator (TSG-300) Waveform monitor (WFM-300)	R-Y/DUB/COMPONENT OUT (terminated with 75Ω) B-Y/DUB/COMPONENT OUT (terminated with 75Ω)  • Metal FREQUENCY (MHz) / LEVEL (dB) 0.2 / $0^{+0.3}_{-0.7}$ 0.5 / $0^{+0.3}_{-0.7}$ 1.0 / $0^{+0.3}_{-1.0}$ 1.5 / −1.5±1.5 • Oxide FREQUENCY (MHz) / LEVEL (dB) 0.2 / $0^{+0.3}_{-0.7}$ 0.5 / $0^{+0.3}_{-0.7}$ 1.0 / −1.0±1.0 1.5 / −1.5±1.5	(CHECK)

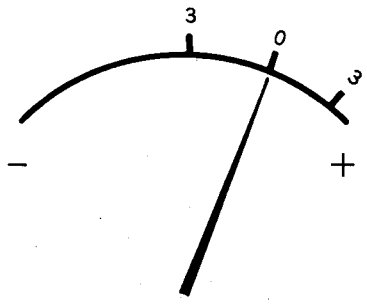
8-5-15. VIDEO CONFI Output Level Adjustment

Preparations for adjustment	Specifications	Adjustments
• CAMERA IN; color bars • CAMERA/LINE SW; CAMERA • Insert a BCT-20M blank tape. • REC mode • CONFI SW; Y • CONFI SW; C Signal generator (TSG-300) Waveform monitor (1750) • After adjustment, CONFI SW; OFF	VIDEO OUT 2. (terminated with 75Ω) SPEC 1. CONFI SW; Y  A=1.00±0.01Vp-p SPEC 2. CONFI SW; C  B=0.9±0.01Vp-p	SPEC 1. ◐RV1001/VRP-1 (K-2) SPEC 2. (CHECK)

8-5-16. Video Meter Adjustment

<table>
<tr><th>Preparations for adjustment</th><th>Specifications</th><th>Adjustments</th></tr>
<tr><td rowspan="2">STEP1.
• CAMERA IN; 75% color bar
• CAMERA/LINE SW; CAMERA
• EE mode
• Put the main unit vertical.
• Push VIDEO SW (S203) /front panel continuously during the adjustment.</td><td>CH-1/CH-2 level meter
 

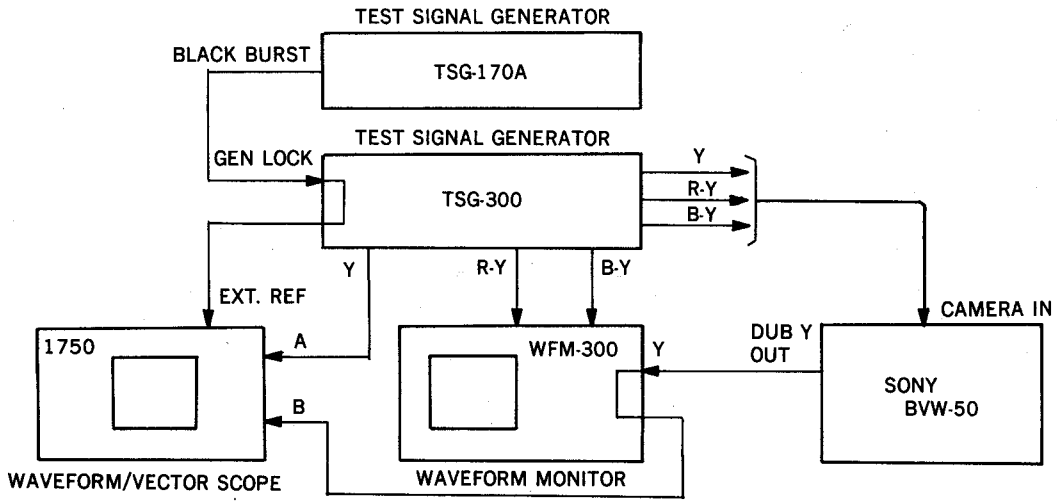
The pointer reading should be "+3"</td><td>CH-1 meter
◐RV206/KY-207 (H-3A)
CH-2 meter
◐RV207/KY-207 (H-3A)</td></tr>
<tr><td>CH-3 level meter
 

The pointer reading should be "0"</td><td>CH-3 meter
◐RV208/KY-207 (H-3A)</td></tr>
<tr><td>STEP2.
• VIDEO IN; 75% color bars
• CAMERA/LINE SW; LINE
• EE mode
• Put the main unit vertical.
• Push VIDEO SW (S203) /front panel continuously during the adjustment.</td><td>CH-4 level meter
 

The pointer reading should be "0"</td><td>CH-4 meter
◐RV209/KY-207 (J-3A)</td></tr>
</table>

8-5-17. Overall Video Phase Adjustment (1)

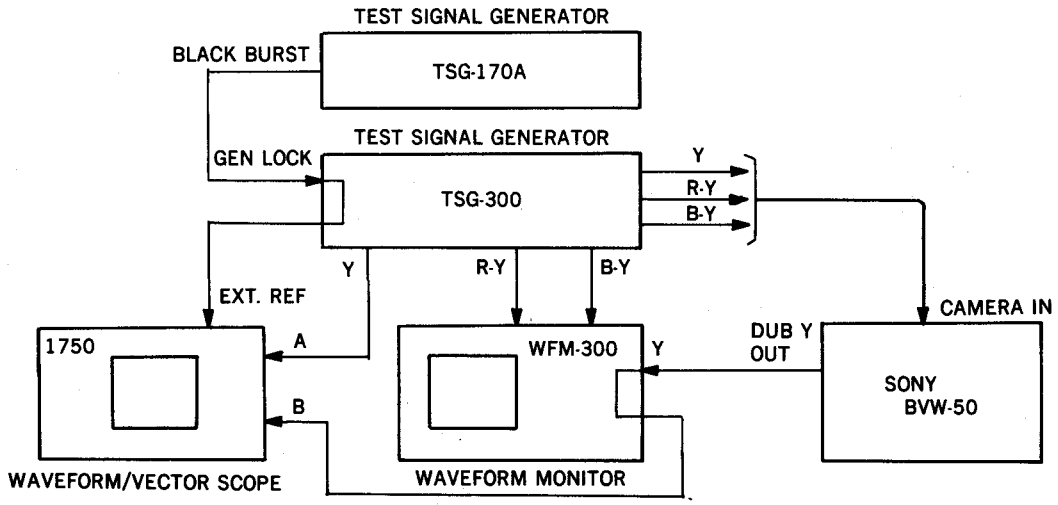
[CONNECTION]

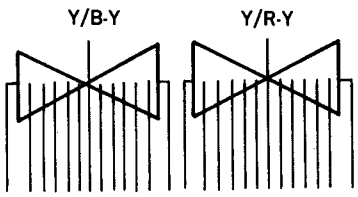


Preparations for adjustment	Specifications	Adjustments
STEP1. • CAMERA IN; BOWTIE • CAMERA/LINE SW; CAMERA • MODE SW; PB/EE • COLOR FRAME SW; OFF Waveform/vector scope (1750) INPUT .... A/B MODE .... WFM Waveform monitor (WFM-300) MODE....BOWTIE	Y/DUB/COMPONENT OUT (terminated with 75Ω) Y/TSG-300 The INPUT A shall coincide with the INPUT B SYNC phase. "SYNC" INPUT A A INPUT B A=0±0.1μs	◐ SYNC PHASE VR/Left side panel =RV606/TBC-19 (E-1A) • Adjust by pushing INPUT A and B of the waveform/vector scope altenately.
STEP2. • Same as STEP1 except the following. Waveform/vector scope (1750) INPUT .... A MODE .... SCH	Y/TSG-300 Set SCH to ZERO degree. B B=0°	◐ PHASE VR/WAVEFORM/VECTOR SCOPE
STEP3. • Same as STEP1 except the following. Waveform/vector scope INPUT .... B MODE .... SCH	Y/DUB/COMPONENT OUT (terminated with 75Ω) B=0°	◐ SYNC PHASE VR/Left side panel =RV606/TBC-19 (E-1A)

8-5-18. Overall Video Phase Adjustment (2)

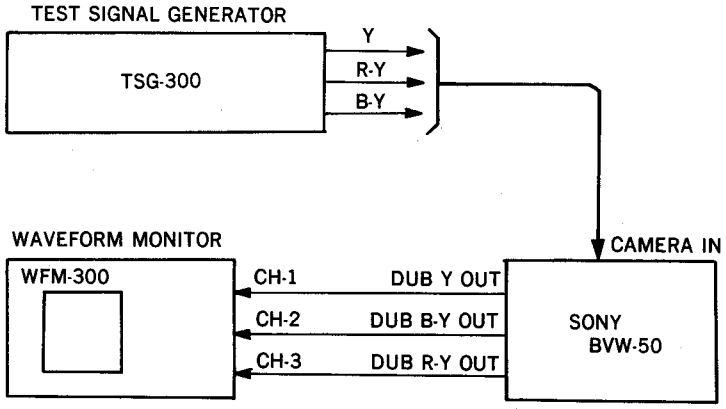
[CONNECTION]

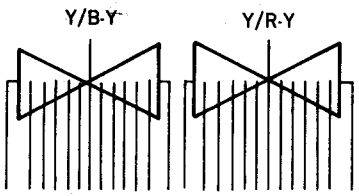


Preparations for adjustment	Specifications	Adjustment
• CAMERA IN; BOWTIE • CAMERA/LINE SW; CAMERA • Perform the self-recording play back with BCT-20M blank tape. Waveform monitor (WFM-300) MODE....BOWTIE	Y/DUB/COMPONENT OUT (terminated with 75Ω)  (Marker; 20 ns/div) Y/B-Y delay≦20ns	◐RV203/VRP-1 (E-1)

8-5-19. EE Component Y/C Delay Adjustment

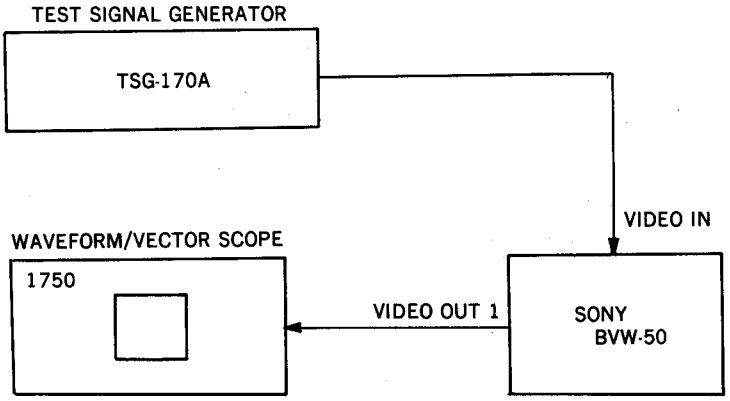
[CONNECTION]

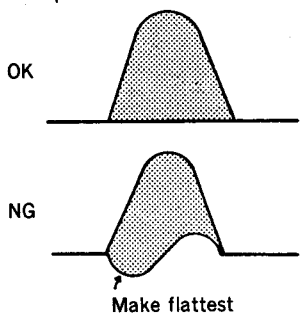


Preparations for adjustment	Specifications	Adjustments
• CAMERA IN; BOWTIE • CAMERA/LINE SW; CAMERA • Insert a BCT-20M and BCT-20G blank tape. • MODE SW; PB/EE Waveform monitor (WFM-300) MODE....BOWTIE	Y/DUB/COMPONENT OUT (terminated with 75Ω) B-Y/DUB/COMPONENT OUT (terminated with 75Ω) R-Y/DUB/COMPONENT OUT (terminated with 75Ω)  (Marker; 20 ns/div) SPEC 1. Metal tape Y/B-Y delay≦20ns. Y/R-Y delay≦20ns. SPEC 2. Oxide tape Y/B-Y delay≦20ns.	SPEC 1. Y/B-Y delay: ◐RV208/VRP-1 (F-1) Y/R-Y delay: ◐RV101/VRP-1 (A-3) SPEC 2. Y/B-Y delay: ◐RV206/VRP-1 (F-1)

8-5-20. EE Composite Y/C Delay Adjustment

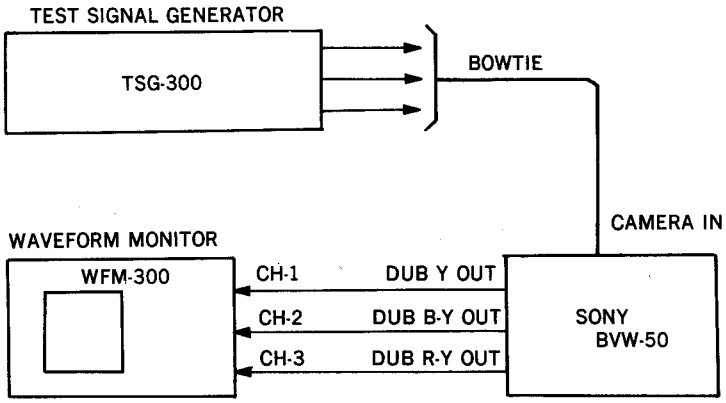
[CONNECTION]

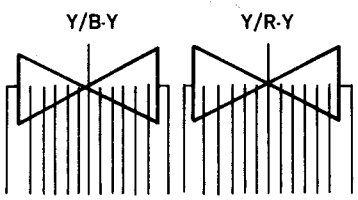


Preparations for adjustment	Specifications	Adjustments
• VIDEO IN; LINE 17 signal • CAMERA/LINE SW; LINE • COLOR FRAME SW; ON • Insert a BCT-20M and BCT-20G blank tape. • EE mode Waveform/vector scope (1750) MODE....LINE 15	VIDEO OUT 1 (terminated with 75Ω) WFM; MOD20T portion  SPEC 1. Metal tape Y/C delay≦20ns. SPEC 2. Oxide tape Y/C delay≦20ns.	SPEC 1. ◐RV209/VRP-1 (F-1) SPEC 2. ◐RV207/VRP-1 (F-1)

8-5-21. Overall Component Y/C Delay Adjustment

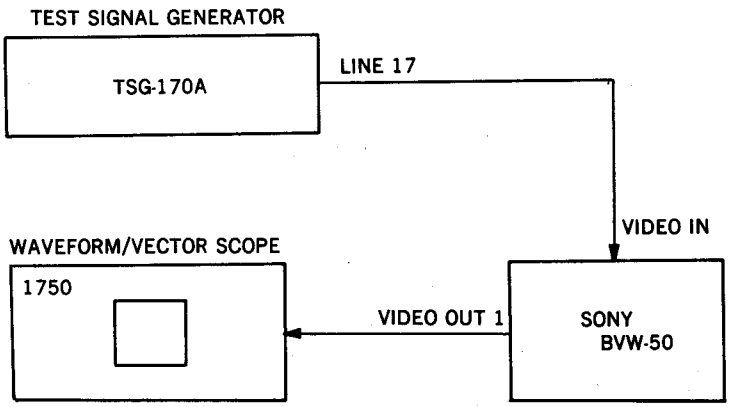
[CONNECTION]



Preparations for adjustment	Specifications	Adjustments
• CAMERA IN; BOWTIE • CAMERA/LINE SW; CAMERA • Perform the self-recording/play back with BCT-20M and BCT-20G blank tape. Waveform monitor (WFM-300) MODE....BOWTIE	Y/DUB/COMPONENT OUT (terminated with 75Ω) B-Y/DUB/COMPONENT OUT (terminated with 75Ω)  (Marker; 20 ns/div) SPEC 1. Metal tape Y/B-Y delay≦20ns. Y/R-Y delay≦20ns. CC delay≦20ns. SPEC 2. Oxide tape Y/B-Y delay≦20ns.	SPEC 1. Coarse adjustment ◐RV205/VRP-1 (F-1) Fine adjustment Y/B-Y delay: ◐RV208/VRP-1 (F-1) Y/R-Y delay: ◐RV101/VRP-1 (A-3) SPEC 2. Y/B-Y delay: ◐RV206/VRP-1 (F-1)

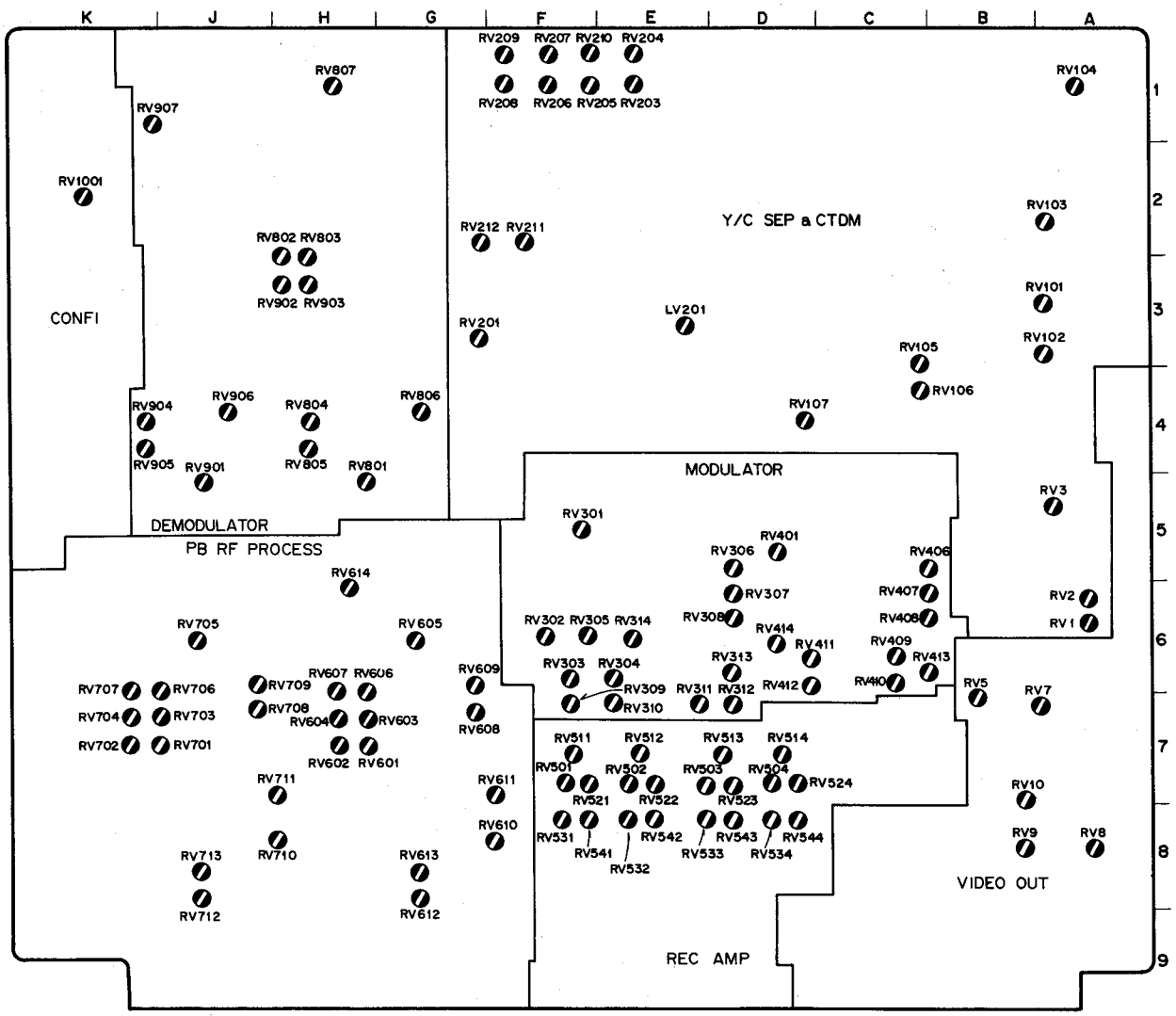
8-5-22. Overall Composite Y/C Delay Adjustment

[CONNECTION]

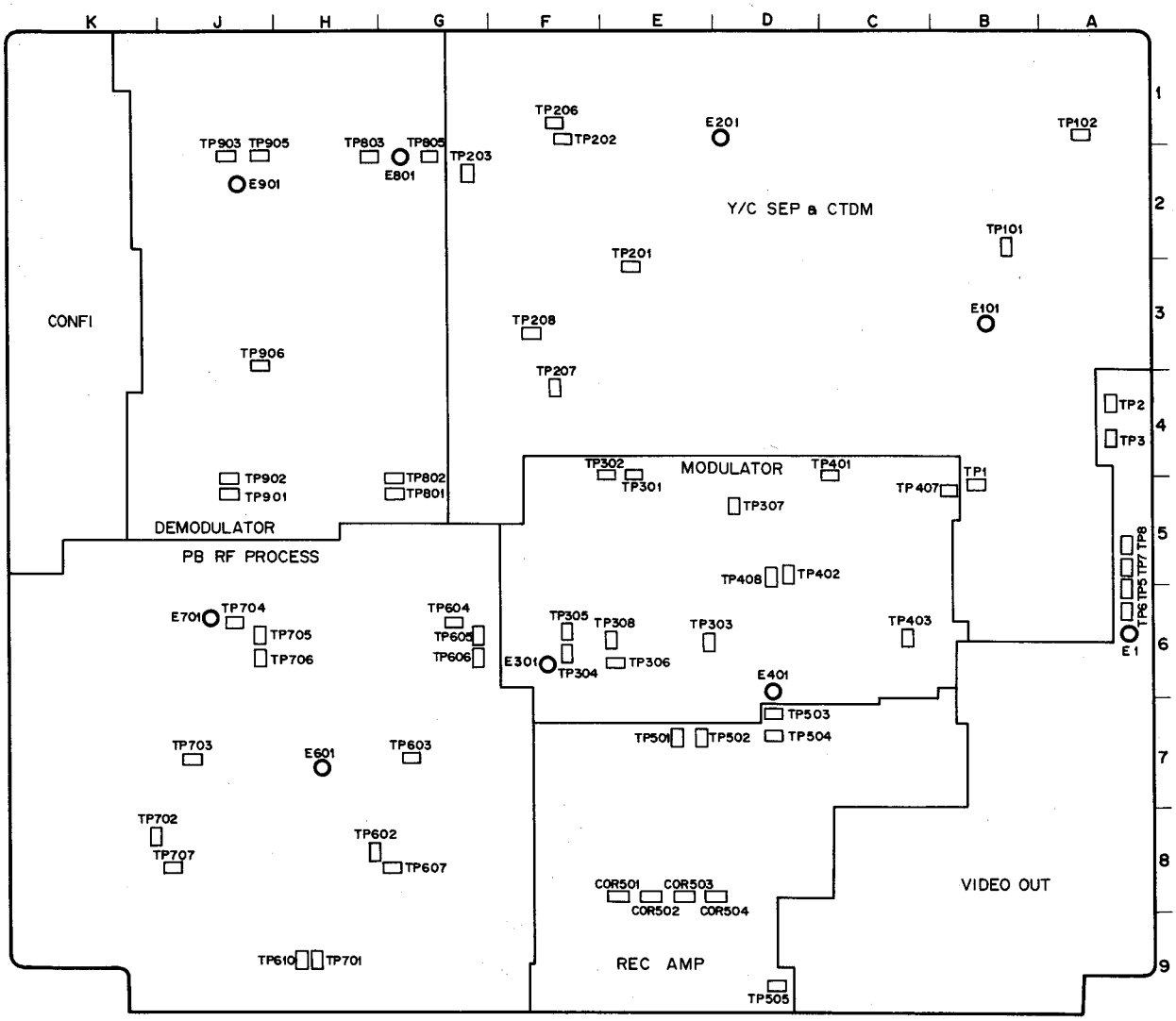


Preparations for adjustment	Specifications	Adjustments
• VIDEO IN; LINE 17 signal • CAMERA/LINE SW; LINE • COLOR FRAME SW; ON • Perform the self-recording/play back with BCT-20M and BCT-20G blank tape. Waveform/vector scope (1750) MODE....15 LINE FIELD....1+3/2+4	VIDEO OUT 1 (terminated with 75Ω) WAVEFORM /VECTOR SCOPE; FIELD 1+3/2+4 MOD 20T portion OK NG chroma advance SPEC 1. Metal tape Y/C delay≦20ns. SPEC 2. Oxide tape Y/C delay≦20ns.	SPEC 1. ◐RV209/VRP-1 (F-1) SPEC 2. ◐RV207/VRP-1 (F-1)

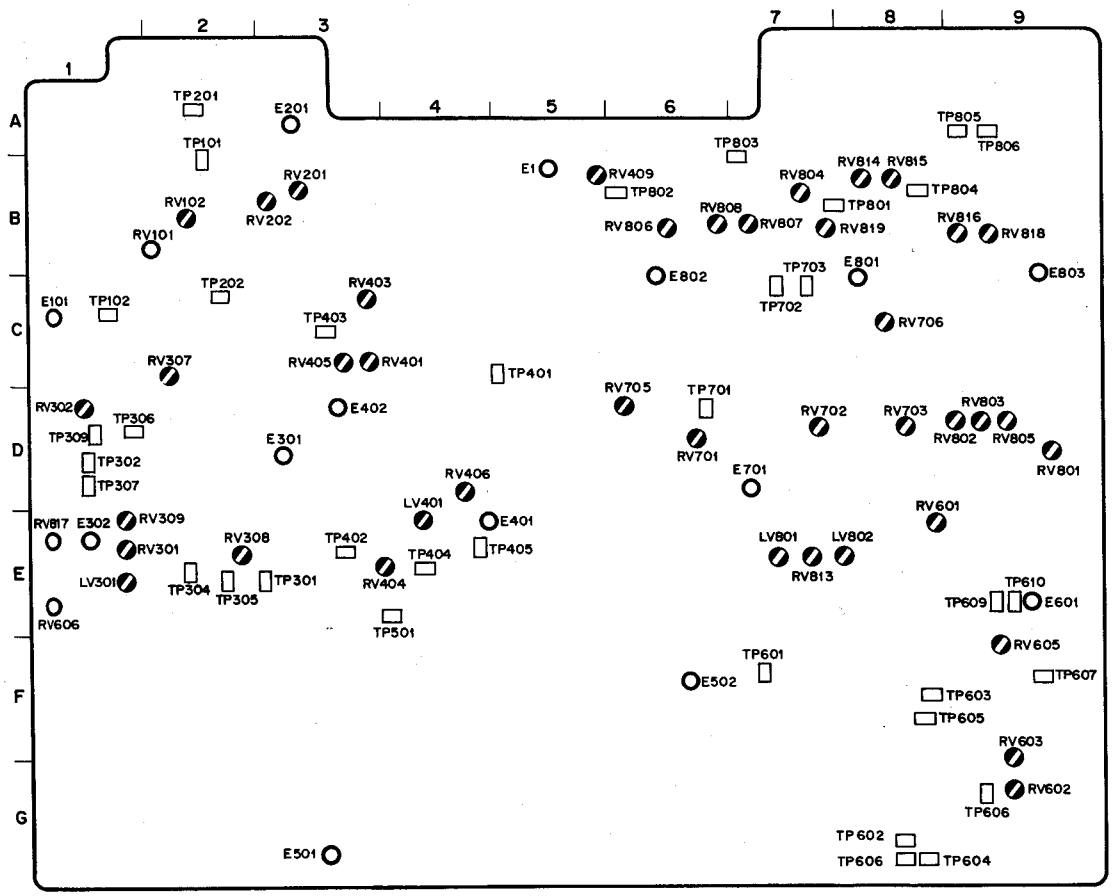
Location of RVs on VRP-1 board. (A SIDE)



Location of CORs , Es and TPs on VRP-1 board. (A SIDE)



Location of Es, LVs, TPs and RVs on TBC-19 board. (A SIDE)



Location of RVs on KY-207 board. (A SIDE)